BRITISH SURGICAL PRACTICE

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BRITISH SURGICAL PRACTICE

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EYE—EXAMINATION OF, IN SURGICAL DIAGNOSIS	ARNOLD SORSBY, M.D., F.R.C.S., Research Professor in Ophthalmology, Royal College of Surgeons of England and Royal Eye Hospital, London

TABLE OF CONTENTS

EYELIDS

G. W. BLACK, F.R.C.S., Ophthalmic Surgeon, General Infirmary, Leeds; Lecturer in Ophthalmology, University of Leeds, and M. C. OLDFIELD, M.B.E., D.M., M.Ch., F.R.C.S., Assistant Surgeon, General Infirmary, Leeds

LIST OF ILLUSTRATIONS

CAESAREAN SECTION

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1. DEFINITION

84.] By Caesarean section is meant the delivery of a viable child through an incision in both the anterior abdominal wall and the uterine wall. The term vaginal Caesarean section has been to a large extent replaced by that of vaginal hysterotomy. The name Caesarean section should not be applied to an operation for removal of the child from the abdominal cavity, as in full-term ectopic pregnancy, but restricted to the abdominal delivery of the child *in utero*.

2. HISTORICAL

Caesarean section is one of the oldest operations in the history of Medicine, indeed, it is so ancient, that it is not known for certain when it was first performed. It was probably first carried out immediately after the death of the mother. Its age is the reason for the obscurity surrounding its name. It is sometimes stated that the operation owes its name to the fact that Julius Caesar was born by this means, an obvious error, because his mother survived his birth by many years.

It is reported that in the year 1500, Caesarean section was first performed upon a living woman who survived the operation. Jakob Nufer, a Bavarian

LIST OF PLATES

3. INDICATIONS

The varied conditions for which the operation is carried out can be judged from the figures given in Table I.

TABLE I

Indications in operations performed by author in the years 1932–1945 inclusive

Contracted pelvis	133
Placenta praevia	8
Pre-eclampsia	11
Contraction ring	23
Breech with extended legs	6
Obstruction from fibroids	5
Tumour of pelvic floor	2
Post-maturity	2
Contracted pelvis and phthisis	3
Contracted pelvis and eclampsia	1
Contracted pelvis and locked twins	1
Age	2
Rigid cervix	5
Previous upper-segment operation	4
Septate uterus and vagina	1
Double uterus and vagina	1
Vesico-vaginal fistula in previous labour	1
Post-partum haemorrhage in three previous labours	1
Cardiac disease	1
Old hip disease	1
Pneumonia and inertia	1
Previous vaginal repair	1
Haemolytic anaemia	1
	221

Some of these indications may be considered in detail.

(1) Contracted pelvis or pelvic disproportion

These patients divide themselves into two groups. (*a*) Those with a major degree of pelvic contraction in whom Caesarean section is the only method of safe delivery. (*b*) Those with a moderate or minor degree of pelvic contraction, in whom the decision for or against Caesarean section is based upon the relationship between the size of the foetal head and the pelvis. This decision can be made with accuracy only after labour has been in progress for some time—the basis of trial labour. In such cases when Caesarean section has to be done, the lower-segment operation is ideal, and indeed, can be more easily carried out after a trial labour than before the onset of labour. It also ensures a scar that stands the strain of subsequent normal delivery and denies the old saying "Once a Caesarean always a Caesarean".

(2) Placenta praevia

It is agreed that Caesarean section gives the best results in the more serious grades of placenta praevia, that is to say it is the method of choice in all cases in which the internal os is wholly or partially covered by placenta, and in those cases in which the edge of the placenta reaches the margin of the internal os.

It is difficult to persuade obstetricians generally that the lower-segment operation is quite safe in cases of placenta praevia. It is rare for the bleeding from the lower segment to be excessive, and only once out of twenty occasions on which I have done this operation for placenta praevia has the amount of bleeding presented any difficulty. Macafee (1945) puts the position very well: "As experience increases one finds that the lower-segment section is the

pig gelder, performed the operation upon his wife for obstructed labour after many midwives had been unable to help her.

The first Caesarean section performed in Great Britain was carried out by Mr. Smith, an Edinburgh surgeon, in 1737 for obstructed labour (Young, 1944). Both mother and child died. The first successful Caesarean section carried out in Great Britain was by a midwife, named May Donelly, in January 1738 (Young, 1944); and to James Barlow of Blackburn belongs the honour of being the first British surgeon to perform this operation with recovery of the mother, in November 1793 (*Medical Records and Researches*, 1798).

In pre-Listerian days the maternal mortality of Caesarean section was very high, and the operation was not generally adopted. In Great Britain it was frowned upon by most obstetricians, though it was increasingly performed on the Continent. The poor results obtained were chiefly due to the complete lack of knowledge of the causes of infection. In addition, because of these results, it was always carried out as a last resort after a woman had been in labour a long time, and many attempts to deliver her had failed. In a textbook written in 1880, it is stated that 131 operations had been carried out in Great Britain with only 23 mothers recovering.

Porro's operation

Dissatisfaction with such results led Professor Porro (1876) to describe a new technique. It consisted in Caesarean section followed by subtotal hysterectomy and removal of both tubes and ovaries, bringing the upper end of the cervical stump out through the abdominal wound, and securing it there. The mutilating effect of this operation was its great disadvantage, though it undoubtedly secured much improved results. In 1882, Sanger suggested a conservative operation which consisted in opening the uterus, removal of its contents, insertion of a drainage tube *per vaginam* and closure of the uterine incision in layers, with silver wire for the muscle and silk for the peritoneum. This operation may be said to have been the immediate forerunner of the modern upper-segment operation.

Lower-segment operation

Lower-segment Caesarean section is of much more recent origin and was first carried out successfully by an American obstetrician, T. G. Thomas of New York, in 1875, although for 100 years before this attempts had been made to remove the child by an incision in the lower part of the uterus and vagina, but persistent fatal results had led to the operation being abandoned. It was only in the early years of the present century that this operation was carried out with any degree of safety, and Continental surgeons tried many different methods of performing it. British surgeons were slow to adopt the operation, and it was not until 1921 that Eardley Holland and Munro Kerr described their first results. Even then their compatriots were difficult to convince of the superiority of the lower-segment operation over the upper-segment operation, and it was only from 1930 onwards that it began to be widely used.

Caesarean section has had an ever-increasing field particularly during the last thirty years. This is found in all maternity hospitals; and though its more frequent use has on the whole been of enormous assistance to pregnant women, the fact that the operation is so simple and convenient has led to its considerable misuse or even to its abuse. This fact is emphasized in the report of every committee appointed to investigate maternal mortality and morbidity.

progress for some hours, but the operation is quite satisfactory before the onset of labour.

6. VARIETIES OF OPERATION

(1) Upper-segment or classical operation

Technique

This is carried out by opening the abdomen through an incision in the middle line of the anterior abdominal wall, half the incision being above the umbilicus and half below it. The uterus is now held in a central position by an assistant and a longitudinal incision made through its anterior wall. The amniotic sac is opened (the placenta having to be torn through if it is attached beneath the incision), the child grasped by the leg and extracted methodically and carefully so as not to damage it by too much vigour and speed. One cubic centimetre of pituitary extract is now injected directly into the uterine muscle. After separation of the child, the placenta is delivered through the uterine incision which is now repaired. Different varieties of suture material and different methods of employing them have been used; though there are still many who use non-absorbable material such as silkworm gut, catgut is the most satisfactory. No. 2 chromicized catgut is used as a continuous suture in two layers, the first to unite the inner halves of the incision and the second to suture the outer half. The peritoneal edges are then brought into close approximation by a continuous stitch of No. 0 catgut on a round-bodied atraumatic needle. The abdominal wound is closed in the usual manner after a peritoneal toilet has been performed.

(2) Lower-segment operation (*see* Figs. 1–5)

Technique

The patient is put in a mild Trendelenburg position. A median subumbilical or Pfannanstiel incision can be used to open the peritoneal cavity, which is then protected by packing. An incision is made transversely in the utero-vesical fold of peritoneum about 1 inch above the bladder margin. The bladder should be pushed down by blunt dissection so as to be able to incise the musculature as low as possible. At this stage, 1 cubic centimetre of posterior pituitary extract is injected directly into the uterine muscle. A transverse incision is now made in the muscle wall of the uterus to open the cavity. This incision may be exactly horizontal but is better if it is slightly curved with the convexity upwards. The uterine cavity is opened in the midline sufficient

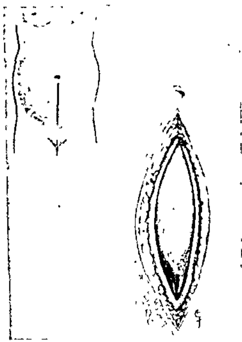


FIG. 1.—Abdominal incision for the lower-segment operation.

objection to glycerine is that it causes considerable stinging if there is any abrasion or fissure. With a lubricated finger the surgeon should next examine the condition of the sphincter muscle, and estimate its power of contraction.

The introduction of the finger into the bowel requires considerable care, but with practice it should be possible to do this without causing any pain or serious discomfort. It is needless to remark that the surgeon's nails should be cut as short as possible.

The front of the finger should be pressed towards the lateral wall of the anus, and then slowly inserted. In this way the minimum of pain and discomfort will be produced. It should always be remembered that the vast majority of lesions in the bowel are within the last ¾ inch. For instance, the orifices of fistulæ, fissures, polypi, piles, and the induration produced by abscesses in this neighbourhood, are generally to be felt within the first ¾ inch. The parts should be carefully palpated all the way round, and any induration felt for. Its extent, etc., should be estimated by feeling it between the finger within the bowel and the thumb without. Finally, the finger should be passed as far up as possible to ascertain whether there is any abnormality high up. In cases of painful fissure it is often difficult to carry out a proper examination on account of the extreme pain caused by the introduction of the finger. This may usually be overcome by keeping the pulp of the finger towards the fissure and pressing firmly in the opposite direction during its introduction. In order to avoid causing pain when making a digital examination of the rectum, the important thing to remember is not to make any sudden movement, but to move the finger very slowly and very gently. The pain as a rule is produced not so much by the finger as by involuntary contractions of the muscle owing to its presence, and much may be done to avoid these contractions by gentle manipulation. The educated sense of touch, which a specialist on diseases of the rectum obtains by long practice, is not a thing which can be speedily acquired. The educated finger is, however, by far the most valuable means of examination. If there is a painful lesion which renders a proper examination difficult, the best procedure is to anæsthetize the part by injecting a little novocain with a fine needle into the tissues around the anus. This will give complete anæsthesia in a few minutes and allow the patient to be examined without pain or difficulty.

Gentleness and skilfulness in manipulation cannot be too strongly insisted upon. At my clinic at St. Mark's Hospital I have often seen a patient who has made no complaint when the house surgeon or myself examined his bowel with the finger nearly jump off the couch with pain when some visiting doctor, not accustomed to making rectal examinations, has inserted his finger. It is a mistake to suppose that piles can

be felt with the finger. Piles, unless thrombosed or ulcerated, convey no particular sensation to the finger, and it is necessary to be able to see them in order to diagnose them. A doctor who asserts, on the evidence of a digital examination only, that a patient is not suffering from piles is committing himself to a statement for which there is no foundation.

The Use of Specula.—There are two desiderata for a speculum—first, that it should give as good a view as possible of the parts; and, secondly, that it can be used without hurting the patient.

The number of different forms of rectal specula that have been invented is legion, as any reference to an instrument-maker's catalogue will demonstrate. Very few of these, however, are of any use in actual practice, and many of them are little more than instruments of torture. Most, if not all, of the expanding or bivalve types of specula are objectionable. The great objection to them is that they have to be passed with the sharp edge in contact with the lesion which it is desired to examine, and that the separation of the blades stretches and tears the parts. This causes pain and bleeding, and is in every way bad. Moreover, the mucous membrane prolapses between the blades, which results in its being impossible to close the speculum in order to withdraw it without nipping the mucous membrane, and so causing further distress. Personally, I never use any form of bivalve speculum.

Another common form of speculum is the fenestrated pattern. This usually consists of a closed or open cone with a gap or window in one side. The speculum is introduced with the gap towards the lesion it is desired to examine. With this instrument there is the advantage that only that part of the bowel wall which is to be examined is exposed, and that only a very small part of the instrument need touch the lesion during introduction.

Most models of this type of speculum are easy enough to introduce, but cause acute pain on being removed, owing either to the edges being sharp, or to prolapsed mucous membrane inside the window, and I have known it to be necessary to give an anæsthetic in order to remove one of these specula. My fenestrated speculum (Fig. 14) is, however, free from any of these objections, as mucous membrane prolapsed into the window slides up the end without any difficulty; and this instrument has been found most satisfactory for the examination of fissures or other lesions within the anal canal.

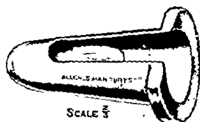


FIG. 14.—AUTHOR'S SPECULUM.

In using any form of fenestrated speculum the surgeon should never rotate it for the purpose of examining a further portion of the anal canal

but should remove it completely, and reintroduce it in the desired position.

Another form of speculum with which every surgeon should be provided, and which is particularly useful for the examination of piles and inflammation of the rectum, such as proctitis, etc., is the modification of Kelly's short rectal tube, which has for some years been used at St. Mark's Hospital (Fig. 15). This is a hollow tube with an obturator

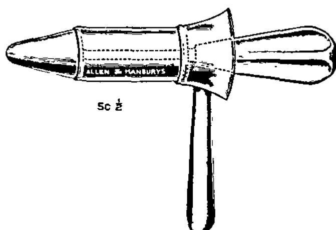


FIG 15—AUTHOR'S TUBULAR RECTAL SPECULUM.

fitting into it, and with a thick front edge. It should be warmed, well lubricated, and then pressed gently into the bowel until the extremity has passed the sphincters. The obturator is then removed, and with a good light an excellent view of the rectum can be obtained. As it is slowly withdrawn, a very good view of the anal canal is obtained. Piles,

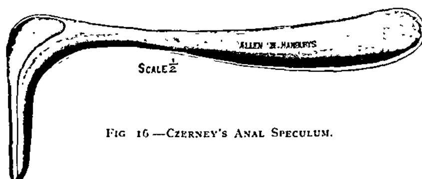


FIG 16—CZERNEY'S ANAL SPECULUM.

if present, will prolapse into the end of the tube, and their size and situation can be very well seen.

Czerney's speculum (Fig. 16) is sometimes useful when examining or treating a fissure or other lesion just within the anal canal. The speculum illustrated in Fig. 17 is useful when treating piles by injection. Whenever a speculum is going to be used it should first be *slightly warmed and then*

well lubricated with vaseline. Glycerine jelly or soft soap, while more easily washed off, are not as good lubricants and are liable to cause more pain.

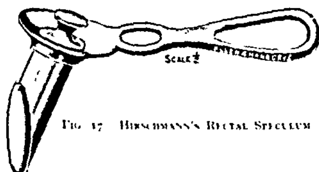


FIG. 17 HIRSCHMANN'S RECTAL SPECULUM

While these two specula are quite sufficient in examining the anal canal, they are of no use in the case of lesions situated in the upper part of the rectum or in the sigmoid flexure; and for this purpose it is necessary to employ the electric sigmoidoscope.

Examination with the Sigmoidoscope.

There are several patterns of sigmoidoscope now in use, but by far the most satisfactory is my modification of Strauss's sigmoidoscope (Fig. 18). This instrument is 30 centimetres long, and consists of a tube closed at

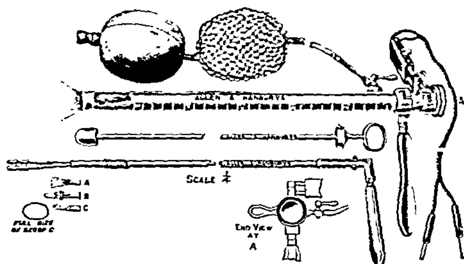


FIG. 18.

the back end by a glass window. Illumination is obtained by means of a small lamp situated about an inch from the end of the instrument against the roof. The lamp can easily be removed for cleaning purposes should it become soiled during the examination. There is an arrange-

ment by which air can be pumped into the tube so as to inflate the bowel and facilitate the introduction of the instrument. In order to pass the instrument through the sphincters, the lamp attachment and back glass are removed, and an obturator inserted. As soon as the nose of the instrument has passed in 2 or 3 inches, the obturator should be removed, the lamp reintroduced, and the instrument subsequently passed by sight alone.

For the *examination of the upper part of the rectum my short electric* proctoscope tube, which is 6 inches long, is all that is necessary. This

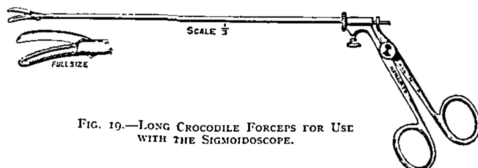


FIG. 19.—LONG CROCODILE FORCEPS FOR USE WITH THE SIGMOIDOSCOPE.

instrument is very easily passed, and causes no pain, so that it can be used without an anæsthetic. It is quite unnecessary to administer an anæsthetic for sigmoidoscopic examination, and it is much better not to do so. All the cases of accident, such as perforation of the bowel wall, that have been reported have occurred under anæsthesia and would probably not have taken place had no anæsthetic been used. It gives an admirable view of the parts, and with it one can examine with the utmost thoroughness the whole of the rectum. It is, however, not long

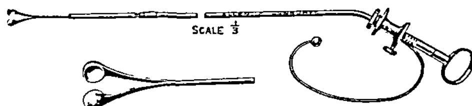


FIG 20.—BRÜNING'S FORCEPS FOR BIOPSY.

enough to reach the sigmoid flexure, and in order to examine the lower pelvic colon the long sigmoidoscope is necessary. As in the case of all special instruments, practice and experience are necessary before it can be passed with ease and safety. In experienced hands it is perfectly safe, and of the greatest value in difficult cases. Even in inexperienced hands the short proctoscope can hardly result in damage, provided it is passed by sight and no force is used in introducing it. It is in constant use at St. Mark's Hospital, and no harmful results have ever been seen there.

It is, of course, obvious that the bowel must be empty before using

any of these instruments. For this purpose it is often necessary to prepare the patient by means of enemata.

The patient may be examined either in the knee-elbow position or in the left Sims or semi-prone position. The former is the easier position

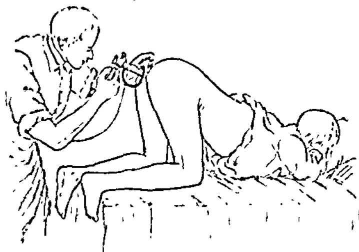


FIG. 21 SIGMOIDOSCOPIC EXAMINATION OF THE COLON WITH THE PATIENT IN THE GENU-PECTORAL POSITION.

for the surgeon (Fig 21), the latter the most comfortable for the patient. If the semi-prone position be adopted, a small, hard cushion should be placed under the left hip, the knees should be well drawn up, and the



FIG. 22 —THE SIMS POSITION FOR PASSING THE SIGMOIDOSCOPE.

feet placed well forward, so as to be out of the way of the surgeon (Fig. 22). The examination is best made with the patient on a high couch or operating-table.

Method of Passing the Tube.—Before introducing the tube, the portion carrying the lamp is withdrawn and the obturator inserted. The instrument should then be warmed by pouring some hot water over it. This is better than dipping into hot water, as the inside of the tube is not made wet. The tube should then be well smeared over with vaseline, and some vaseline put on the anus. The instrument should be carefully inserted into the anus, and pushed gently onwards till it has entered about 4 inches; the end of the instrument should be kept in a backward direction towards the sacrum. As soon as it has gone in this distance the obturator should be removed, and the lamp portion of the tube inserted in its place. The switch can now be turned on and a little air pumped into the bowel by means of the rubber bellows. The tube should now be passed gently onwards by sight. The surgeon should look for the lumen of the bowel, and gently insinuate the end of the tube into it, if necessary pumping in a little air to open out the bowel walls. All manipulations should be as gentle as possible. The end of the instrument must not be pressed against the mucous membrane, but the folds of the bowel pushed aside by a slight puff of air. In this way the instrument is passed by sight, and the end of the tube need not even touch the mucous membrane, but work its way behind a cushion of air. Thus there is no danger of causing damage to the walls of the bowel, however diseased they may be. It is necessary, in order to insure success, that the direction of the bowel, when tracing it up from the anus, should be remembered. At first the bowel passes backwards, following the curve of the sacrum; then it turns very sharply forward to pass over the sacral prominence, and in order to get the end of the tube over this prominence it must be carried forward.

At the junction of the rectum with the sigmoid there is always a well-developed fold of mucous membrane similar to the valves of Houston. This partly occludes the bowel lumen, and, being situated anteriorly, the end of the instrument is very liable to be caught by it as it is being carried forward over the sacral prominence. It is partly this valve and partly the sharp bend of the bowel which usually occurs here that make it difficult to pass the instrument into the sigmoid flexure. As a rule, the sigmoid passes to the left just after the recto-sigmoidal junction, but this is not invariable, and it may be found to pass to the right or straight forward in exceptional cases.

As has been stated, considerable difficulty may be experienced in getting the instrument to enter the sigmoid. The upper portion of the rectum below the recto-sigmoidal junction is very capacious, and often forms a sort of cul-de-sac behind this junction, or at any rate there appears to be such a cul-de-sac in certain cases. What happens is that after the tube has passed over the sacral prominence the bowel appears to end blindly,

no continuation of the lumen being observable. In such cases the opening into the sigmoid will usually be found situated lower down and anteriorly.

When the end of the tube has entered the sigmoid flexure it usually has to be deflected rather towards the patient's left side, though, as has already been stated, it may have to be passed to the right side in exceptional cases. The tube is a straight one, and, of course, cannot go round curves; but what really happens is that the sigmoid flexure, which is a freely movable portion of the bowel, is threaded on to the instrument much in the same way as the finger of a glove is drawn on a stick.

Care must be used in negotiating sharp curves, and on no account must the instrument be forced round the curve if there is definite resistance. The use of force under such circumstances causes pain by

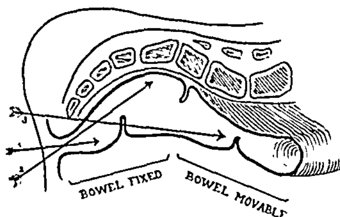


FIG 23.—DIAGRAM TO SHOW THE SUCCESSIVE DEFLECTIONS OF THE INSTRUMENT WHICH ARE NECESSARY IN THE PROCESS OF INTRODUCTION.

The arrows show the direction of the tube at each point. The bend of the bowel to the left at the recto-sigmoidal junction is indicated, together with the approximate positions of the valves of Houston.

putting the mesentery on the stretch, and might even tear it. With practice there is usually little difficulty in passing the instrument to its full length. The changes in the direction of the tube while being passed are shown roughly in the diagram (Fig. 23).

After the tube has been introduced as far as it will go it is slowly withdrawn, during which operation the whole lumen of the bowel comes into view, and any growth, ulceration, or other abnormality present can be detected and examined. Should a growth be found, its exact dimensions can easily be ascertained, and by watching whether or not it moves with the intestinal wall on inflating the bowel, or by pushing it gently with the end of the tube, one can easily determine its mobility and estimate the chances of successfully removing it by operation. The distance of any lesion from the anus is ascertained by looking at the graduated

scale on the outside of the tube. Should it be necessary to swab away any blood or fæcal material from the surface of the growth, or even to remove portions of it for microscopical examination, this can be done by removing the back glass of the instrument and passing swabs on special holders down the tube, or by using special forceps made for the purpose.

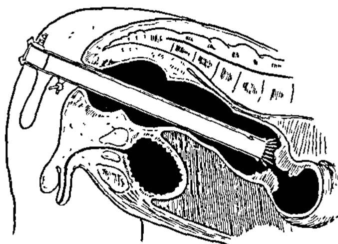


FIG. 24.—DIAGRAMMATIC DRAWING SHOWING THE INSTRUMENT IN POSITION FOR EXAMINING A GROWTH AT THE LOWER END OF THE SIGMOID FLEXURE.

The distance to which the instrument can be passed varies considerably with different patients. In those who have a long sigmoid mesentery and no adhesions round the bowel it is usually possible to pass the instrument to its full length, and to see well up to the middle of the sigmoid flexure. When, however, the mesentery is short or the bowel is surrounded by adhesions it cannot be passed beyond the lower portion of the sigmoid.

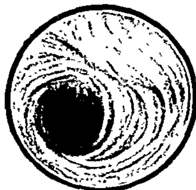


FIG. 25.—LEFT INTERNAL ILIAC ARTERY SEEN THROUGH THE WALL OF THE SIGMOID FLEXURE.

The instrument is not so easily passed in women as in men, chiefly owing to the fact that the angle of the sacrum is much greater in women, and consequently the rectum has a greater curve.

I have had considerable experience with this instrument, and have never met with any unpleasant results from its use. Instances have been reported in which the bowel has been damaged, but this has only happened to inexperienced operators, and has been due to the use of force when introducing the tube. Under no circumstances should any force be used, and once it has entered the rectum it should be passed entirely by sight.

One little warning in connection with the use of the sigmoidoscope is worth giving. If during the examination it is necessary to remove the lamp attachment or to open the back of the tube by removal of the glass window—as, for instance, when a swab-holder or other instrument is to be passed down the tube—the air should be allowed to escape slowly, either by the tap or by opening the glass window slowly. If this is suddenly removed and there is any pressure of air in the bowel, the bowel wall may be pushed into the end of the tube when the pressure is released and the mucous membrane be injured.

I have found that there is seldom any necessity to pump in much air; all that is required is an occasional puff to straighten the bowel. If a quantity is introduced it induces peristalsis, which defeats the surgeon's object and causes the patient discomfort.

The condition of the mucous membrane of the pelvic colon should be carefully examined, also the mobility of this portion of the colon.

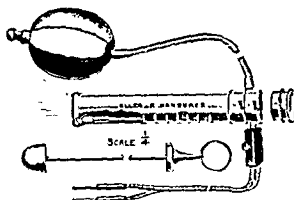


FIG. 26.—THE AUTHOR'S OPERATING SIGMOIDOSCOPE (LARGE BORE)

The normal sigmoid flexure is quite freely movable in all directions, and if, except at its junction with the rectum, it is found to be fixed and cannot be moved from one position, we may assume the presence of adhesions or a tumour, though there is the possibility of a very short mesocolon.

With a special small-bore instrument quite young children can be examined with ease, and these small-bore instruments are also useful if one wants to examine above a stricture.

Bimanual Examination.

Other methods of examination which are available in difficult cases are bimanual examination, with one or two fingers of the right hand in the rectum and the left hand on the abdomen, the patient being in the left lateral or dorsal position; and an examination under an anæsthetic.

This latter is particularly advisable in difficult cases, or when the patient complains of severe pain on any attempt being made to examine the parts, and it is always advisable to insist upon such an examination if the surgeon is not satisfied that he has been able to make a thorough examination without an anæsthetic. In any case an examination of the abdomen should never be neglected, for it is important to ascertain the size of the liver, and to find out whether tumours or other lesions exist in the abdominal cavity, etc.

The use of probes for the diagnosis of fistulæ is to be avoided if possible. As a rule the tracks of fistulæ can be much better mapped out with the finger by feeling the indurated areas than by means of any probe. Personally I only make use of probes for diagnostic purposes in very exceptional cases. They easily cause considerable pain, and give very little information.

Pathological Examination of Stools.—While such examinations are of great value in the diagnosis of diseases of the colon, under which heading they will be referred to at length (see p. 387), they are not of much importance in the diagnosis of rectal complaints, where a direct visual examination of the lesion is possible.

Portions of carcinomata and other lesions in the rectum can be removed with biopsy forceps, such as are illustrated in Fig. 20, and sent to the pathologist for report. This should be an invariable practice with neoplasms, however obvious the diagnosis may seem, as without such a check mistakes may occur.

In some cases swabbings or scrapings may be taken of lesions in the rectum for microscopical and bacteriological examination.

X-Ray Examination.—It is seldom that such examinations are required with rectal lesions where more direct means of making a diagnosis are available. In bad cases of fistula X-ray examinations after injecting the fistulous tracks with lipiodol are of considerable assistance. This subject will be found fully discussed in Chapter XXII.

CHAPTER III

PREPARATION OF THE PATIENT FOR OPERATION, AND AFTER-TREATMENT

THE success or otherwise of operations upon the rectum depends very largely upon careful preparation and after-treatment; more so, in fact, than with operations upon other parts of the body. Operations upon the rectum and anal orifice can only be performed aseptically if the patient has been carefully prepared beforehand to ensure no fæcal matter is present in the bowel, and that none is likely to get there for some time afterwards.

Nearly every surgeon has his own special method of preparing patients for operation, and there are doubtless many which are quite satisfactory in practice. The value of a proper method of preparation for operations upon the rectum can hardly be over-estimated, as the success or otherwise of all operations upon this part of the bowel depends to a very large extent upon the success or failure of the preliminary treatment—in other words, upon whether the bowel is really empty at the time of operation, and will remain so until the surgeon deems it advisable to get the bowel to act. The first essential of any method of rectal preparation is that there shall be a practical certainty of the bowel being empty, and that, should the patient strain down or cough as the result of unequal anæsthesia, this will not result in the soiling of the wound. The second necessity is to obtain these conditions so far as possible without putting the patient to a great deal of discomfort and inconvenience in the process of preparation.

The method of preparation which is employed at St. Mark's Hospital, and which has been in use for many years, is extremely successful; so much so, indeed, that, although from twenty to thirty operations a week are performed there, it is not more than about once in six months that we find that the bowel has not been properly emptied. Patients are always taken into the hospital at least two days before the operation. Two rhubarb and colocynth pills are administered on the night of admission. The night before operation the patient is given a dose of opium and catechu, and the following morning, some four hours before operation, the lower bowel is washed out with enemata. The chief point in this method of preparation is the use of opium and catechu on the night before operation, followed by an enema the next morning. The effect of the

opium is to inhibit peristalsis, so that, when the enema is given, the lower bowel is emptied without inducing peristalsis and bringing fresh material from above into the field of operation.

My own method of preparing patients for operation varies slightly from the above, although it was founded upon it, and is as follows:

Day before Operation—*Aperient*.—One ounce of castor oil first thing in the morning.

Evening before Operation.—Soap-and-water enema and a dose of the following medicine:

℞	Tincture of opium	10 minims.
	Spirit of chloroform	15 ,,
	Solution of acetate of ammonia	30 ,,
	Tincture of catechu	½ fluid drachm.
	Compound tincture of cardamoms ...	1 ,,
	Cinnamon-water	1 fluid ounce.

Patient to have a hot bath, and be shaved if necessary.

Morning of Operation.—Three to four hours before operation a plain water enema (1½ pints), to be repeated if not returned clean.

This method of preparation is successful almost without exception, and causes the minimum of inconvenience. The opium gives the additional advantage of ensuring to the patient a good night's sleep before the operation.

Considerable modification of this method of preparation may, of course, be necessary in the case of children or old people, or in patients suffering from some special constitutional condition.

Many surgeons, in order to prevent soiling of the wound during operation, are in the habit of introducing into the rectum a tampon of gauze to which a silk thread is attached, and of removing this at the end of the operation. But in the first place, if the patient is properly prepared, the use of a tampon is quite unnecessary; and, secondly, the withdrawal of the tampon at the end of the operation, unless it is done extremely carefully, very frequently results in the soiling of the wound by the upper part of the tampon, which must be dirty. Personally, I never use tampons either before or after the operation. They often cause considerable pain and discomfort if left in after the operation, and I have known cases in which it was necessary to administer an anæsthetic for their removal.

In order to obtain an aseptic field of operation for working in the rectum or its immediate neighbourhood the use of antiseptics is necessary, and it is not safe to trust to so-called aseptic methods alone in this region. The antiseptics which I have found to be by far the most useful are lysol and monsol, as they do not coagulate mucus, nor do they cause excessive secretion by the rectal mucous membrane. They should be used in the strength of about 1 drachm to the pint.

The practice of giving antiseptic enemata before the patient comes to the operating-table is not a good one. It must be remembered that considerable absorption takes place from the rectal mucous membrane, and that even weak antiseptics, if any large amount is retained, may cause poisoning. It is better to use antiseptics only after the patient is anæsthetized. My own practice is thoroughly to wash out the lower part of the rectum with ether soap and warm water on gauze swabs. When this has been done, the rectum is douched out with lysol or monsol, 1 drachm to the pint, until I am satisfied that it is quite clean. I have recently been using monsol because I find that it causes the least amount of irritation of the wound and at the same time has a high bactericidal value. Any excess of fluid is then mopped away, and, lastly, before any incision is made, the area through which the wound is to be made and the surrounding parts are thoroughly cleaned with alcohol. All this preliminary cleansing should be carried out very thoroughly, but it should always be remembered that large quantities of strong antiseptics must not be used, owing to the risk of poisoning.

General Preparatory Treatment.—While the foregoing is all the preoperative treatment that is required for an ordinary operation for piles or fistula in the case of an ordinary healthy individual, it is not sufficient in the case of a serious operation such as excision of the rectum, or where the patient is not a normally healthy subject. Rectal operations of quite a serious nature have sometimes to be performed upon patients who are bad risks, and when this happens it is incumbent upon the surgeon to do all that lies in his power to reduce the risks to the patient to the very minimum that is possible. Even then he will not always be successful, but at least he will have the satisfaction of knowing that he has done all that is humanly possible towards the desired end.

There are many kinds of patients that are bad operative risks, and it is the duty of the careful surgeon to detect such cases and to do what is possible to protect them. We are apt to suppose that the question of wounds becoming septic or not depends entirely upon the aseptic technique of the surgeon and his assistants; but this is not so, and another factor which must be taken into consideration is the resistance of the patient to septic infection. There are some patients who become virulently septic in spite of every care on the part of the surgeon. Also there are cases where the patient has already such disease of the lungs or heart that almost any operation becomes a serious risk. It is therefore necessary to consider how in the light of modern medical science we can by preparatory treatment protect such bad-risk cases that they will respond normally to the necessary operation.

There are certain general principles which can help us. It is very important to see that the patient is not dehydrated—that is to say, that he

has not been deprived of water. Preliminary purgation, formerly a common practice, was a potent factor in producing this condition. One should make certain that the patient has plenty of fluid and that his tissues are not lacking in water.

As many patients have not a sufficient store of sugar in the liver it is a general practice now, and a very good one, to give sugar either in the form of dextrose or candy on the day before operation, so as to ensure that there is no sugar deficiency.

The old practice of starving patients before operation is practically dead, and indeed in these days, when ether and chloroform are seldom used, has no point. But it is most important that the patient should have a full diet. There is no reason at all why a patient who is going to have an operation under avertin or spinal anæsthesia should not have breakfast first, and there is every reason why he should.

There are certain tests which can give very valuable information. Thus, the blood urea can be ascertained, and if it is found to be much above the normal the patient is certainly a poor risk, and steps should be taken to try and improve the kidney function before attempting to operate. I always have this test made in elderly persons before performing a serious operation. If sugar is present in the urine, the blood-sugar must be tested and reduced to the possible minimum by insulin before attempting to operate.

In the case of an anæmic patient the blood should be tested, and if the blood-count shows an anæmia of less than two-thirds of a normal blood the patient should either be transfused or his blood tested and a suitable donor arranged for if wanted. In the case of really serious operations such as an abdomino-perineal excision for cancer, the patient should always be graded and a donor arranged for, so that transfusion can be performed at the end of the operation.

Anæsthesia.

The period since the last edition of this book was published in 1923 has been marked by quite extraordinary improvements in the methods of anæsthesia. Chloroform and ether are quite obsolete, at any rate as regards operations upon the rectum or abdominal cavity. Vomiting after an operation, from being a usual and customary event, has become an unexpected rarity. All the objections to anæsthesia from the patient's point of view have been eliminated, and a patient of the present day who has to undergo an operation on the rectum can hardly be in any dread of the anæsthetic, as he undoubtedly, and not unreasonably, was ten years ago. There is still a slight risk attached to anæsthesia, but it is a very minute one in skilled hands and there are no unpleasant after-effects.

The practice of different surgeons, of course, varies very considerably, some preferring one method of anæsthesia and some another, but there is more or less uniform agreement in the use of basal anæsthesia supplemented with regional, local, spinal anæsthesia or gas and oxygen for the actual operation.

My own practice for operations on the rectum is to use avertin or evipan as a basal anæsthetic, and use spinal anæsthetic with stovain or novocain for producing complete anæsthesia of the operative field. Many cases are operated upon under low spinal alone, while local anæsthesia is used in a few cases.

The ideal anæsthetic is certainly avertin and a low spinal or local. It has the advantage that the patient falls asleep in his bed and does not have to undergo the unpleasantness of being removed to the operating theatre; that he remains asleep during the operation and for several hours afterwards. By the time he recovers consciousness the wound has probably become comparatively comfortable and he is able to take a meal. Most of what may be called the mental unpleasantness of an operation is absent, and as there is no struggling or vomiting to disturb the wound, the amount of after-pain is considerably diminished.

The improvement in basal anæsthesia is very rapid at the present time, and no doubt many of the difficulties and objections accompanying those basal anæsthetics now in use will be overcome, but these anæsthetics already mark a great improvement upon the old methods of inhalation anæsthesia.

Local anæsthesia combined with morphia or scopolamine is a very valuable method in many cases, and probably represents the maximum of safety in anæsthesia at present obtainable; but local anæsthesia, unless used in combination with some form of basal anæsthesia, involves rather a severe mental strain upon the patient, as, although he should not be hurt, he will all the time be expecting to be.

Method of Producing Local Anæsthesia for an Operation on the Anal Region.—There is a considerable choice of solutions which may be used. The most popular, and probably the best, at the present time is a solution of novocain at a strength of ½ to 2 per cent. Novutox also is a good solution; it has the advantage of being antiseptic and acts rather more rapidly than novocain. Percain at a strength of 1 per 1,000 may also be used, and has the advantage of acting for a much longer period. The chief objection to it is that it is rather slow in producing anæsthesia. Cocaine, on account of its high toxicity, is better avoided.

It is a very common practice to add adrenalin to the solution with the object of making it act for a longer time and to reduce the amount of bleeding. Adrenalin is, however, a particularly dangerous drug to use in the neighbourhood of the rectum, as if accidentally even a small

quantity is injected into a vein, very serious consequences may result. Personally I prefer never to use adrenalin in this connection.

There are various methods of producing local anæsthesia of the anal region, but the following, if carefully carried out, is very effective: An ordinary hypodermic syringe with a very fine sharp needle containing 2 per cent. of novocain or novutox should be used to raise a small blister in the skin about 1 inch behind the anal margin and the same distance in front. A large syringe filled with 2 per cent. novocain and with a longer and rather stouter needle is now used, and the left forefinger is passed into the rectum, and the needle passed through the blister behind the anus and guided by the finger in the rectum is passed up to the level of the sphincter until the point of the needle is lying in or just behind the sphincter muscle. The solution is then gently injected, the point of the needle being moved about so as to infiltrate the whole of the area posterior to the anal canal. The needle is then almost withdrawn and reinserted so as to inject first one and then the other ischio-rectal fossa, but without making a fresh puncture in the skin. The needle is then withdrawn and the same procedure is carried out in front of the anal canal. After a period of about five to ten minutes there should be complete anæsthesia of the whole anal region and anal canal, and relaxation of the sphincter. The surgeon should not be in any hurry to start performing the operation until he is quite sure he has obtained complete anæsthesia. The presence of anæsthesia will be demonstrated by the fact that the sphincter relaxes. The operation can now be proceeded with in the ordinary manner, and the operative field should remain completely anæsthetic for certainly three-quarters of an hour.

The dressing of the wound after an operation on the rectum is a matter requiring some consideration. It is not easy to find a really suitable dressing on which one can rely to keep the wound under aseptic conditions. I have found sterilized ointments to be the most useful form of dressing, combined with small pledgets of wool to protect the actual wound surface. Vaseline makes an excellent dressing, and if obtained in tubes can be readily sterilized by boiling. Wool is much better than gauze, as it can be more easily removed without hurting the patient. A short piece of rubber tube, to which either a safety-pin or a loop of silk is attached, should be introduced into the rectum. This is very useful in preventing oozing from the wound, and in enabling flatus to be passed without its coming into contact with the wound area; but it is not always necessary, and can often be dispensed with. A large rectangular pad of wool and a T-bandage generally complete the dressing for most rectal operations. In the case, however, of extensive operations, such as those for malignant disease, the ordinary T-bandage is not effectual in keeping the dressings in place; and by far the best dressing

in such circumstances is a large triangle of gamgee tissue, the base of the triangle being sewn to the back of the waistband, and the apex of the triangle just reaching to the perineum, where two strips of bandage should be sewn to it, so that their ends can be brought up and tied to the waistband in front. If properly made, this forms a very effectual bandage, and can be relied upon to keep the dressings in place. The best form of T-bandage is one made of flannelette with a double strip to come across the perineum. When it is desired to exert pressure over the anus, the best kind of bandage is one put on as follows: A piece of bandage 5 inches wide is first tied round the patient's waist. The remainder of the bandage is then passed under this waistband at the back in the middle line, and the bandage carried across the perineum, between the legs, and under the waistband in front. The two ends are then brought together over the anus and tied firmly together. This makes an excellent bandage, and is easily constructed out of any wide bandage or strip of flannel.

After-Treatment.—There is hardly any department of surgery in which more depends upon the successful after-treatment than in the case of rectal operations. Indeed, in the case of fistula more depends upon the successful after-treatment in many instances than upon the operation itself. In difficult cases it is always advisable for the surgeon himself to attend to the after-treatment, or at least to supervise it.

Nursing, etc.—The bed should always be examined to see whether it is suitable. A bed which sags down in the middle is almost useless for nursing a rectal case. As a rule, a narrow, fairly high bed with a good spring mattress is the best. Water-beds are entirely unsuitable for rectal cases, and where bedsores are feared a Vi-spring, or similar mattress should be used.

The nurse should be taught to move the patient by the draw-sheet, and not by catching hold of him. This is particularly important in the case of patients after excision of the rectum. Dressings are far less likely to be displaced, and the patient is not nearly so liable to be hurt when moved on the draw-sheet. With a little practice it is quite easy to move even a heavy patient on a draw-sheet without touching him.

Treatment of the Wound.—After most rectal operations I prefer to dress the wound with sterilized vaseline and a small pad of plain gauze. Over this is placed a large pad of wool coming well up between the legs, and held in place by a T-bandage. The form of bandage which is most comfortable for the patient is one made of flannelette. Flannel often causes irritation of the skin, and flannelette has not this objection. The T-bandage should be made by the nurse out of two long strips of flannelette 6 inches wide. One strip should be long enough to pass round the waist and tie in front, and the other strip should come between the legs and

be split down to the peritoneum in front. Plain gauze makes the best dressing for rectal wounds on account of its softness and unirritating properties. The pad immediately next the wound should be quite small, so that it will fit well between the legs, and this should be covered with a larger one to keep the first in place. The wound should be dressed at least twice a day. The patient should be brought to the edge of the bed, and a mackintosh placed underneath him. The dressings should then be removed, and the parts thoroughly syringed outside with 1 in 40 carbolic by means of a glass syringe or douche. This keeps the wound clean in the case of piles, and in the case of fistula it keeps the packing sweet. Fresh dressing is then applied, with plenty of sterilized vaseline. I have for some years now used sterilized vaseline as a dressing in these cases with very satisfactory results, and I believe it to be much better than the ordinary dressing used for wounds in other parts of the body. In the case of a fistula, hot fomentations should be applied at intervals of four hours, commencing on the day after the operation. This is very comforting to the patient, and by increasing the supply of blood to the part it hastens the formation of granulations and the healing of the wound. In a case of piles it is often advisable to change the vaseline for powder after the bowels have been opened for the first time. This keeps the part dry, prevents irritation, and makes the patient more comfortable. The best powder for the purpose is a mixture of starch and boracic powder, which should be applied freely. Aristol and dermatol also make excellent powders for this purpose.

In treating fistula wounds baths are of the greatest value, and my own practice is to start these as soon as the bowels have been opened, and then to let the patient have a bath every morning and again in the evening, the wound being redressed each time after the bath. In the case of fistula the dressing, which consists of small pledgets of wool, will soak out in the bath, and the patient will thus be saved the discomfort of its forcible removal. The bath should be as hot as the patient can comfortably bear it, and it is perhaps an advantage to add boracic acid to the bath water—at any rate, at first. The dressing should always be done morning and evening, and each time after the bowels have acted. When the bath has been given, the parts should be lightly syringed with 1 in 40 carbolic, and then wool very gently inserted into the whole wound area. Anything like plugging of the wound is particularly to be avoided. In addition to the dressing of the wound, it is usually advisable, where a portion of the wound is within the anal canal or extends to any height within the bowel, to have the rectum washed out with a weak solution of lysol or boracic acid twice daily. This is best done either by giving small enemata of the solution or by means of a two-way rubber irrigating tube. Where the latter is not available, an excellent

substitute can be made by inserting a fairly large piece of rubber tubing into the bowel, and passing a small rubber catheter through or at one side of this. The solution is then allowed to flow in through the catheter and out through the larger tube.

The Aperient.—There is a good deal of difference in the practice of surgeons as to the length of time allowed to elapse after a rectal operation before the bowels are opened. Many surgeons wait till the fifth day. Personally, I see no advantage in confining the patient's bowels for so long a period, and there are certainly many disadvantages. My own practice is to have the bowels relieved on the second or third day. There is not much gained by keeping the bowels confined after the second day, and a great many patients suffer considerably from wind and distension if their bowels are kept confined for a long period, even though the diet is very light. It is worth while to take considerable care over the method of getting the bowels opened for the first time after an operation for piles, and it is quite possible for the bowels to be relieved without the patient having any pain if care is taken, although it is often an exceedingly painful proceeding, and one much dreaded by the patient, unless such care is exercised. I have found that the following method, if properly carried out by the nurse, will generally insure an almost painless action of the bowels: On the second day liquid petroleum is given, and in the evening the patient is given a mild aperient, such as a drachm of cascara, and on the morning of the third day an enema is administered with a No. 10 Jacques catheter introduced into the rectum. This enema consists of thin gruel 1½ pints and olive oil 6 ounces. The bowels will generally act after this, and in most cases the patient is allowed to make use of a commode by the side of the bed, and is particularly warned against straining. As soon as the bowels have been opened the patient is assisted into a hot hip-bath, which should be already filled and in the same room. After the first action of the bowels an aperient should be given each night, and an enema given in the morning, as described above. The best aperient for this purpose is either a small dose of cascara or liquid petroleum, or both, or some similar mild laxative, which, however, should be sufficient to insure that the stools are quite fluid. A tablespoonful of petroleum twice a day, in addition to some mild aperient overnight, will generally insure a perfectly easy action of the bowels daily; and this is essential from the point of view of satisfactory healing, and also from that of the comfort of the patient.

The Use of Dilators.—Many surgeons advise that after the first week a finger should be passed into the bowel daily, with the object of preventing any contraction during the healing process. This is an excellent method if contraction is feared, but personally I have never used it or seen any necessity to do so. There should be no danger of contraction if the opera-

tion is properly carried out, and the constant introduction of a finger or of a dilator is often extremely painful. I never allow a finger to be passed into the rectum until healing is practically complete.

Relief of Pain.—Owing to the better technique now used in operations upon the rectum, there is nothing like the amount of pain that there used to be after these operations. If care is taken to see that the operation is performed on aseptic tissues and the wound is kept clean until granulation has commenced, the amount of pain following the operation for piles or fistula should be quite negligible. Occasionally, however, there is pain, and it is advisable to give something for its relief. Ten grains of aspirin every six hours will often keep the patient quite comfortable, and is, as a rule, all that I find necessary in uncomplicated cases of piles, and that only for the first twenty-four hours. It is a mistake to suppose that the pain can be relieved by cocaine suppositories or cocaine solutions applied locally. They are generally a complete failure, and often cause unpleasant after-effects.

Many patients, when confined to bed, are unable to sleep properly, although they may not be in any pain. In such cases a sleeping-draught should be administered. There are now many excellent narcotics which do not cause any unpleasant after-effects in the majority of patients.

Retention of Urine.—This complication sometimes occurs after operations for piles, and occasionally after other operations upon the rectum. It is a mistake to be in too much of a hurry to pass a catheter. As a rule the patient will generally manage to pass urine himself; but should he be unable to do so, the urine must be drawn off with a catheter, proper antiseptic precautions being taken to prevent any possibility of infecting the bladder. It is, of course, as well to assure the patient that the difficulty in passing urine is not directly due to the operation, but is merely a nervous effect which is of no consequence, and which will soon pass off.

After the operation for resection of the rectum retention of urine is usual for a few days, owing to interference with the parts in contact with the bladder and nerves leading thereto. It is best in these cases to tie a catheter into the bladder for three or four days to insure that the bladder is not allowed to become distended. The retained catheter should, if possible, be connected to a Duke's apparatus beside the bed, so as to prevent the bladder becoming infected from the decomposition of the stale urine inside the catheter. We have found at St. Mark's Hospital that the use of this apparatus has reduced the percentage of infection of the bladder from a tied-in catheter by at least 50 per cent. (see Chapter XIX, p. 336).

Confinement to Bed.—It is always advisable to keep the patient in a recumbent position until the wounds have quite healed. A great many operations have been failures for no other reason than that the surgeon

has allowed the patient to get up too soon. It will often be noticed that a wound which was healing quite well begins to give trouble directly the patient is allowed to get about. However inconvenient it may be for the patient, he should be rigidly confined to bed until the wound has entirely healed, though there is no objection to his having baths or to his getting up to use a commode.

Plastic operations upon the anus, such as operations to restore the muscle in cases of incontinence or to remedy a patulous anus, etc., require very special care to insure aseptic healing. Dressings should be changed several times a day and a very skilled nurse is a necessity.

Diet in Relation to Operations upon the Rectum.

It is extraordinary how little is really understood with regard to diet in the treatment of conditions of the large bowel. It is too often assumed that the diet which is correct for diseased conditions of the stomach is also correct for lesions in the bowel 20 to 30 feet lower down.

In most textbooks the diet advised in such conditions as ulceration of the large bowel is a bland, easily digested form of food, like milk, albumin, beef-tea, or soup. It is generally advised that all indigestible foods, such as those which contain cellulose or meat fibre, should be sedulously avoided. It might be said that this form of dietary is almost universally recognized as the correct thing in disease of the large intestine, where it is desired to obtain a minimum of irritant effect upon the mucous membrane or to give rest to the large bowel.

Now, while this may be, and doubtless is, the correct principle on which to treat disease of the stomach, it does not follow that it is right for disease of the large bowel.

The all-important fact in finding the correct dietary is not the condition of the food when swallowed, or even after it leaves the stomach, but the condition of the residue which reaches the large bowel. Indeed, the only important factor is the condition of the fæces which result from the diet, and this is entirely lost sight of in the diets usually prescribed.

We must, therefore, study the different diets with a view to the fæcal material which results from them, and prescribe that diet which will result in the least irritating form of residue.

Now, the ordinary milk diet, erroneously described in most textbooks as a fluid diet, results in the formation within the colon of small, hard, black scybalæ somewhat resembling sheep excrement. The fæces from a purely milk diet are almost always hard, and there is a tendency to constipation. In addition, there is a pronounced tendency in most patients to the formation of gas within the bowel; and often a number of highly injurious decomposition products of albumin are formed.

The only apparent advantage of such a diet in disease of the colon is the comparatively small quantity of residue; but this in reality, far from being an advantage, is an actual disadvantage. It results in the formation of small scybalæ which the bowel is unable to move on properly, with the consequence that they tend to be unduly retained in it, and to cause or increase local irritation.

The same remarks apply more or less to all very highly nutritious diets. They nearly all result in hard formed fæces and large quantities of harmful by-products of digestion, which, owing to the small quantity of the fæcal residue, are not adequately diluted.

It is even doubtful whether the large bowel is more at rest when it is empty than when it is full. The colon is never intended to be empty during life; in its normal condition it contains a certain amount of fæcal material. *In animals that have been living a natural life the colon is* always found partly full, no matter at what period of digestion they may be killed. This is true of all animals that I have examined, and I do not believe that there is any period in the life of an animal or human being during which the colon is in any sense empty except as the result of starvation. The colon, like the heart and bloodvessels, is in almost continuous movement, and it cannot be put at rest by modifying the diet.

Any diet which tends to the production of hard and scybalous fæces is certainly bad. Too fluid fæces, on the other hand, are almost equally bad. The colon is not designed to deal with fluid contents, and its functions are seriously impeded thereby. It is well known that it is impossible to obtain any healing of an ulcerated bowel while there is diarrhœa.

We have, therefore, to find a diet which will produce a form of fæcal material or colon contents intermediate between hard scybalæ and fluid.

The form of fæcal material which is the least irritating to the colon, which best carries harmlessly away any poisonous by-products of digestion, which gives the colon the least amount of work and best protects its interior, is a semi-solid one, about the consistency of pomade. This conclusion is unquestionable, whether we reach it by physiological argument or by the results of actual experience.

To come, then, to the consideration of the form of diet necessary to produce semi-solid contents in the colon. One of the first essentials is to insure its semi-solid character, and for this purpose an excess mineral oil (petroleum) is necessary. Petroleum, being a mineral, cannot be absorbed by the mucous membrane, and if present in sufficient quantity will insure that the stools cannot become hard or form scybalæ. The fæces should be of such consistency that when passed they tend to spread out and resemble ordinary soft pomade. When the patient is passing fæcal matter of this character, we know that the correct amount of petroleum is included in the diet.

One or two teaspoonfuls of liquid petroleum (British Pharmacopœia) three or four times a day with a little bismuth added to it, or four or five teaspoonfuls of white vaseline in the day, will, if administered at or near meals, quickly render the fæcal contents quite soft and unirritating.

Apart from the petroleum, the diet must be modified according to the circumstances of the case. In chronic and obstinate constipation, and in most cases of chronic colitis, the diet should be increased to the point of stuffing the patient. Meat should be allowed sparingly. Bacon is good, and plenty of farinaceous food should be taken. With such a diet and an excess of oil the bowels should soon act twice a day without medicine. Where it is possible, great assistance may be obtained at first by ordering the patient to have about ten minutes' abdominal massage after each meal.

In cases of ulcerative colitis, or where there is tenderness or bleeding, the diet must contain less indigestible residue, but should be a full diet, as ulcerative colitis is a wasting disease and the patient will require all the nourishment he can get, as in this disease the small intestine is not affected, he can utilize a full diet with advantage. It is very wrong to in any way starve a case of ulcerative colitis. Milk should be almost stopped, and puddings, bread-and-butter, meat, fish, etc., be allowed, together with the excess of fat or petroleum.

In ordinary cases of operation upon the rectum or colon my practice for some years has been to allow the patient to have ordinary solid food from the start, keeping as far as possible to the kind of diet to which he or she has been accustomed. Milk and beef-tea are, however, forbidden, and fruit is used very sparingly. No attempt is made to starve the patient under any circumstances. So-called liquid diets have been almost entirely given up, and are now scarcely ever used.

Wine or spirits are allowed in moderation if the patient is accustomed to them, and no reasonable restriction is put on the use of tobacco after the operation is over, though the patient is strongly advised not to smoke for a day or so previous to an inhalation anæsthetic.

It has been my experience that since I have abandoned slop diet for my patients, and have fed them as if no operation had been performed, such complications as wind pains, flatulence, and insomnia are far less frequent than they used to be.

CHAPTER IV

CONGENITAL MALFORMATIONS OF THE RECTUM AND ANUS

IMPERFORATE anus and other congenital malformations of the rectum and anus are very rare. They are only found in a very small proportion of all births. It has been estimated by Starr and other observers that only one child in every 10,000 is born with imperforate anus. Lesser degrees of these congenital conditions, in which the anus is not entirely imperforate, are probably commoner than this estimate would lead us to suppose, but they do not so certainly come under the doctor's observation unless incompatible with life.

Although these conditions are so seldom met with, it is most necessary that they should be understood and the appropriate treatment known, as the life of the child will depend upon prompt treatment.

The explanation of the congenital abnormalities of the rectum and anus is one of the most complicated problems of human embryology. It would be quite outside the objects of this book to enter into a detailed description of the developmental sequence in the formation of the rectum and anus.

In the early stages of the development of the human embryo the allantois is continuous with the hind-gut, and forms the body stalk. The embryo itself becomes bent forward upon this body stalk, and in this way a U-shaped bend is formed at the point where the allantois joins with the hind-gut. This is shown in Fig. 27. The apex of this bend now becomes dilated, and forms a chamber situated at the posterior end of the embryo, into which opens the allantois in front and the hind-gut above (Fig. 28).

As the hind portion of the body continues to grow backwards, this chamber or pouch of the hind-gut also continues to grow backwards past its anterior or cloacal opening. This anterior or cloacal opening, where it was at first continuous with the allantois (Fig. 28), becomes normally closed in the process of development (Figs. 29 and 30).

The hind-gut and the pouch which has grown backwards from it, and which has been called the "post-allantoic gut," are now without any communication with the outside of the body. This communication is normally established by the proctodeum, which is developed as a depres-

sion in the perineum on the outside of the body, meeting with this post-allantoic gut and opening into it.

It will thus be seen that the rectum and anus are developed from three distinct embryonic structures: (1) The hind-gut; (2) the pouch developed

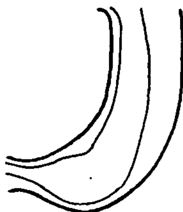


FIG. 27.—CONDITION OF THE HIND-GUT AND ALLANTOIS AT THE EARLIEST STAGE.

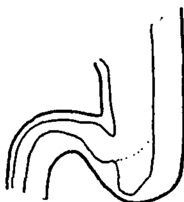


FIG. 28.
Note that the hind-gut has grown back with the allantois.

from the hind-gut, and called the "post-allantoic gut"; and (3) the proctodeum. The points which mark the limitations of these embryonic structures in the adult rectum are, from the point of view of treatment,

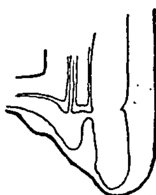


FIG. 29.
The post-allantoic gut has grown back farther, and the separation from the allantois is almost complete. The Müllerian ducts are seen opening into the allantois.

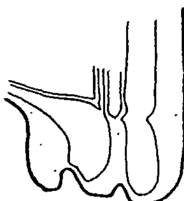


FIG. 30.
The communication between the hind-gut and allantois has closed, and the proctodeal depression has formed.

of considerable importance. The point of junction of the hind-gut and the post-allantoic gut is indicated in the adult rectum roughly by the reflection of the peritoneum from the anterior surface of the rectum.

The point of junction of the post-allantoic gut and the proctodeum is

indicated in the adult rectum by the anal sinuses or sinuses of Morgagni.

It will be observed that at an early stage of embryonic life there is a definite communication between that portion of the hind-gut which subsequently becomes the rectum and the allantois in front, from which the genito-urinary organs are later developed. In cases of imperforate rectum the post-allantoic portion of the gut is missing, and consequently we may expect to find the termination of the pervious gut somewhere near the peritoneal reflection from the front of the rectum. Similarly, the opening between the allantois and the hind-gut, when persistent, occurs at a definite point—in the prostatic urethra in the male, and in the posterior vaginal wall and just below the cervix in the female.

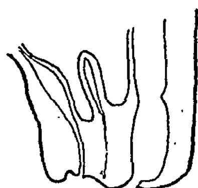


FIG 31.
This shows the rectum formed by the junction of the proctodeum and the hind-gut. The uterus has been formed from the lower end of the Müllerian ducts The vagina has not yet been completely canalized

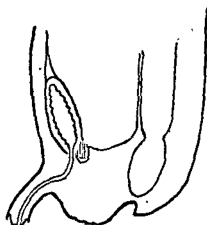


FIG. 32.—TYPE OF IMPERFORATE ANUS IN WHICH THE PROCTODEUM AND HIND-GUT HAVE FAILED TO JOIN

The malformations of the rectum and anus which may result from arrested development fall into two main classes: (1) A septum divides the anus from the rectum—this is called "imperforate anus"; (2) a portion of the tube is missing altogether—this is called "imperforate rectum."

There are a great many different varieties of each of these two classes of malformations. The deformity may consist solely in the condition produced by the arrested development, or it may be increased and altered by the secondary changes resulting from the deformity.

Deformities resulting from the Proctodeum and Anus not having Joined properly.—This is the condition produced when the septum, which always separates the post-allantoic gut and the proctodeum at one period of fœtal life, has not been entirely obliterated.

The septum may have been only partially obliterated, and then there

is a partial narrowing, or stricture, at the point of junction between the anus and rectum, the rest of the parts being normally developed.

The septum may be complete, the so-called condition of "imperforate anus." The septum in such cases may vary from a thin sheet of tissue, which is bulged down by the meconium contained in the rectum above, or it may be a thick membrane. The position of the septum also seems to vary considerably; it may be situated at the supposed point of junction of the proctodeum and post-allantoic gut—that is to say, at the position of the anal sinuses. This is the position at which one would expect to find it. Not infrequently, however, it is situated lower down, or appears to be, and then we must either assume that secondary changes have produced it after the arrest in development, or that it is due to some condition as yet unknown.



FIG 33.—CONGENITAL DEFORMITY OF ANUS. MEDIAN RAPHE CONTINUOUS ACROSS ANUS RESULTING IN A DOUBLE OPENING (AUTHOR'S CASE)

The view has recently been put forward that the anus is not formed by a depression in the ectoderm of the perineum, but results from the absorption of a definite cellular mass situated between the post-allantoic gut and the perineal ectoderm. The absorption of this mass is said to commence laterally. This view as to the development of the anus, which is probably the correct one, will explain the presence of a membrane anywhere between the anal orifice and the termination of the post-allantoic gut, as we have only to assume that absorption of the cell mass has been incomplete at one part.

This view also explains another curious malformation, where the anus is divided into two lateral halves by a membrane placed antero-posteriorly. Some four or five cases of this condition have been reported. This condition can be explained by assuming that the "cellular mass" has been absorbed laterally, but that the central portion has failed to be absorbed.

A well-marked case of this kind was reported by Stansfield Collier. The child, a boy, had a thick fold of skin passing backwards from the scrotum, and continuous with the median raphé of the perineum to the tip of the coccyx. It divided the anus into lateral halves, and fæces passed on each side of it. Similar cases have been described by Morgan and by Tuttle. I have seen this condition on three occasions. There were two separate openings divided by a band of skin which looked like

a continuation of the median raphë of the perineum across the centre of the anal opening. I have noticed that in these cases the deformity is merely superficial, as the sphincter muscle is normal and surrounds a normal anal canal. Very occasionally there may be two anal canals. I once operated on a gentleman who had a fistulous track close to the anal opening. On opening up the track of the fistula I found that it was lined with epithelium and was 1½ inches long. The upper end opened into the rectum above the anal canal. Inside the track at the lower end there were hairs growing from the walls, and the only explanation seemed to be that originally there had been two proctodeums opening into the hind-gut, one of which had become the functioning anus and the other had persisted as a fistulous track.

When the arrest of development has been more complete, still greater deformity may result. Thus the anus may be represented merely by a dimple, or may be altogether absent.

Conditions resulting from Arrested Development of the Rectum.—The condition here results from arrested development of the post-allantoic gut. This condition has been called "imperforate rectum." The anus may or may not be normally developed; but even when well developed the rectum is situated at some distance from its extremity. It has frequently been stated that in the cases where this condition is present the pervious portion of the rectum may be situated anywhere in the pelvis. It seems almost certain, however, that this statement is incorrect.

As has already been stated, the part of the rectum which has been arrested in development is that portion formed by the post-allantoic gut. The pervious portion of the rectum will therefore be found at the point at which the post-allantoic gut is developed from the hind-gut. This point, as already mentioned, is marked by the anterior reflection of the peritoneum from the rectum—that is, by the lowest portion of the peritoneal cavity—and the pervious portion of the gut will of necessity also be situated behind the peritoneum; so that in all such cases the pervious portion of the bowel will be found not higher than the lowest part of the peritoneal cavity, and behind it.

In most of the cases of imperforate rectum where the post-allantoic gut has not developed the original opening of the hind-gut into the allantois persists (Fig. 34). In Curling's statistics of imperforate rectum, 20 per cent. of the cases showed a communication between the hind-gut and the urethra, and it is probable that this much under-estimates its real frequency. In all the cases that I have seen there has been evidence of some communication on careful examination.

As that portion of the allantois immediately in front of the hind-gut subsequently becomes the bladder, it follows that the pervious portion of the rectum is found in these cases to open into the bladder. This is

the case in the male, and the opening is almost always situated in the neighbourhood of the prostate. In the female the vagina is developed between these two structures, and consequently the opening in the female is into the vagina instead of into the bladder. The position of the opening is most often posteriorly, just below the cervix uteri, for reasons into which it is not necessary to enter here The opening may, however, be into any other part of the posterior vaginal wall.

This opening between the hind-gut and the prostatic portion of the urethra in the male, or the vagina in the female, is present in most cases of true imperforate anus. The opening is frequently very small, and is probably often missed in the dissection

In some cases the anus is found to be abnormally situated either in the perineum or elsewhere. These cases are of considerable interest, and very difficult of explanation. Several cases have been reported where the rectum was normally developed, but the ureters or uterus opened into it.

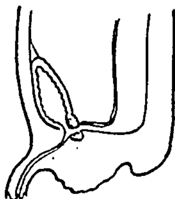


FIG 34 – TYPE OF IMPERFORATE ANUS IN WHICH THE EXTREMITY OF THE HIND-GUT HAS FAILED TO DEVELOP, WHILE THE ORIGINAL CLOACAL OPENING TO THE ALLANTOIS HAS PERSISTED

Treatment.—The varieties of malformation of the rectum and anus which are the most important from the point of view of treatment are those where there is no outlet for the fæces. Such a condition of things is generally soon noticed, and the doctor's attention called to it.

It is of the utmost importance that the condition should be promptly treated, and an outlet for the fæces provided with the least possible delay. There can be no object in deferring the operation, and the child's chances of recovery will be seriously decreased by any delay.

If any anus exists, this should be carefully examined to see if any bulging of the rectum into it can be detected. Should it be obvious that the condition consists only of a septum separating the anus and rectum, all that is necessary is to incise this membrane by a crucial incision, the remains of the septum being snipped away with scissors. This will give a free passage to the meconium, and it will be only necessary for the parts to be subsequently kept dilated by the occasional passage of the mother's or nurse's finger.

In all cases where the anus is absent, or where no bulging or other indication of the position of the rectum is found, much greater difficulty will be experienced.

The old-fashioned method of trying to establish an opening by means

of the trocar and cannula is altogether bad, and should never be attempted. Fatal injuries may be, and often are, inflicted by the use of this instrument. Thus the peritoneum is often opened and peritonitis set up, and such accidents as perforation of the bladder or of great pelvic bloodvessels have been recorded.

The child should be placed in the lithotomy position, and in a good light. An incision should be made from the base of the scrotum to the tip of the coccyx, and exactly in the middle line of the perineum. This incision should be made deeper posteriorly than anteriorly, and the rectal pouch should be looked for in the hollow of the sacrum. The surgeon should introduce his finger into the wound, and try to feel the bulging of the rectal pouch. Pressure upon the abdomen will sometimes make the rectum bulge down into the pelvis, and facilitate its recognition.

It is most important to keep the dissection as much as possible in the hollow of the sacrum, as otherwise there is considerable danger of wounding the genito-urinary organs.

The guides to take in searching for the rectal pouch have already been indicated in discussing the anatomy. They are the lowest portion of the peritoneal cavity, immediately behind which the rectal pouch should be found. Another valuable guide in a male infant is the prostate gland; in a female, the cervix uteri.

Should much difficulty be experienced in finding the bowel, the coccyx should be removed in order to give more room. This procedure has been much advocated by several modern writers upon the subject.

In some cases the undeveloped portion of the rectum is represented by a fibrous band, and when this is recognized it may be used as a guide to find the bowel.

When the bowel has been found, an attempt should be made to bring it down and affix it to the skin edges before opening it. This is not, however, always possible, and it may have to be opened *in situ*. Whenever possible, the bowel should be brought down and carefully stitched all round to the skin wound. This is not only a great safeguard against subsequent periproctitis, but also leaves a much more satisfactory condition of affairs than simple incision.

In the rare cases where it is not possible to bring the bowel down to the perineum, it may sometimes be attached to the skin just below the sacrum after excision of the coccyx.

The stitching should always be carried out very carefully, so as to close the wound entirely if possible.

Should it be found impossible, after a careful search, to find the bowel, the only thing left is to perform colostomy. Sometimes, after opening the abdomen and finding the bowel, it can be pushed down and brought out at the perineal wound, and a perineal opening thus established.

In the cases where the anus is absent and the rectum opens into the vagina, the deformity is in no way incompatible with life. There are several cases where women with this deformity have grown up and been married and borne children. A case is recorded by the late Sir Charles Ball of a woman whose rectum opened into the vagina. She suffered no inconvenience from this circumstance, and was the mother of six children.

In these cases, provided that there is a sufficiently free exit for the fæces, no immediate operative treatment is called for. Later on an attempt can be made to transplant the intestinal opening backwards into the normal situation, and to restore the vulva by the formation of a recto-vaginal septum. Several cases have been recorded where this has been done successfully after one or two operations (see p. 62).

When the rectum in a male infant opens into the urethra or bladder, the condition is incompatible with life, and an operation must be performed at once to establish a perineal opening.

In the case of female children born with imperforate anus the rectum in most cases opens on the posterior vaginal wall, and as a rule functions sufficiently well to enable them to survive without the necessity of an operation. Such children obtain a certain degree of control over the bowel actions, due to the vulval muscles, and it has generally been the practice to leave the condition permanently, as it is not incompatible with life. On the other hand, such girls are far from normal, and when they grow up cannot get married, and will certainly suffer considerably from their abnormal condition. I have operated on several such children and obtained excellent results. The operation should not be performed until they are over ten years of age, as the parts are not large enough to enable the operation to be performed properly. The operation is performed as follows:

The patient is placed in the lithotomy position, and an incision is made in the central line of the perineum starting just behind the opening of the rectum in the posterior vaginal wall. The incision divides the posterior vaginal wall and passes through the area where the anus ought to be. The perineum is split right back as far as the coccyx. The opening of the rectum in the vaginal wall is dissected out and the rectum thoroughly freed from the sides of the pelvis. There is always a curve in the rectum in such cases towards the bladder. This curve must be got rid of by freeing the rectum on the short curvature, which will be next the peritoneal cul-de-sac. The rectum must be freed here very carefully, and the peritoneum should not be opened. If the rectum is well freed, the opening which was in the posterior vaginal wall will come down quite easily without traction to the proper situation. When the rectum can be displaced quite easily, the levator ani muscles should be carefully sutured into their proper position and a modified perineorrhaphy

performed to make a new perineum and bring good firm tissue between the rectum and vagina. The end of the rectum is carefully sutured in the proper position and the mucous membrane sutured to the skin. Finally, the posterior vaginal wall is repaired and the wound sewn up with a few fine cigarette drains.

Case.—A girl, aged fourteen. The child was born with no anal opening and the rectum opened into the vagina; she had never had proper control over the bowels, and was brought by her mother to see if anything could be done to remedy her condition and make her more like other children.

The patient had an aortic and mitral murmur (? congenital heart). No other abnormality. In the situation of the normal anus was a slight puckering of the skin with some pigmentation, and slight contraction of the puckered area could be elicited on stimulation, but there was no opening of any kind. The vestibule of the vagina was rather larger than natural for the child's age, and the rectum opened into the posterior wall of the vagina about half-way up.

An incision was made in the central line of the perineum, dividing the vagina posteriorly and passing through the centre of the puckered area which represented the position of a normal anus. The perineum was split as far back as the coccyx. The lower end of the rectum was then dissected from the posterior vaginal wall and thoroughly freed from the sides and back of the pelvis; this was the most difficult part of the operation. When sufficiently freed to come quite comfortably into its normal situation, the end of the rectum was sutured to the skin in the situation of the puckered and pigmented area. The divided edges of the levator ani muscle were sutured and a modified perineorrhaphy performed to make a new perineal body. Finally, the posterior vaginal wall was repaired and the skin edges sutured together.

The patient developed a very good control over the new opening, and at the present time appears to be normal. There is a good vaginal passage, and the control over the new anus is excellent.

Case.—A girl, aged nine. Condition exactly similar to that in the first case. A slight puckered area could be seen in the situation of the normal anus, and contraction could be elicited at this spot by stimulation, showing that a certain amount of external sphincter muscle existed.

An incision was made in the mid-line, care being taken to pass through the puckered area at the normal situation of the anus. A transverse incision was made just behind the vagina to give more access, and the rectum was completely separated from the vagina and isolated. The peritoneal reflexion was exposed, but not opened. The rectum was thoroughly freed and brought back to its normal situation, the mucous membrane being sutured to the skin. The perineum was repaired and the levator ani muscles united in front of the rectum. The posterior vaginal wall was repaired. Healing occurred by first intention, and three months later the control over the new anus was very good.

In all cases it is of the utmost importance that the opening sh be kept well dilated by the frequent passage of a finger or bougie the bowel.

Prognosis.—In all *cases of true imperforate anus or rectum the progn* is not good. This does not mean that it is altogether hopeless, there plenty of cases on record where children born with such deformities h as the result of successful operative interference, grown up and led us lives. More frequently, however, great trouble has been experience keeping the opening into the rectum pervious, the constant use of bou and other means of dilating the passage being necessary. Again, in m cases where the anus is absent no true sphincteric control is obtai and there is a continual liability to fæcal incontinence, rendering the c a nuisance alike to himself and those surrounding him.

The best results are to be expected in those cases where it has l possible to bring down the mucous membrane of the bowel and st it to the skin. The worst cases are those where colostomy has had be performed.

A great many plastic operations have been invented for the purp of establishing a normal condition of the parts in children born v some of these deformities.

CHAPTER V

HÆMORRHOIDS

Hæmorrhoids are undoubtedly a very ancient malady. Certainly as far back as one can trace the history of medicine at all it is possible to find evidence of piles. I have in my possession an old book published in 1612 entitled "A Discourse on the Whole Art of Chirurgerie," by Peter Lowe, Scottishman, and it contains a chapter entitled "Of Tumours in the Fundament called Hæmorrhoids," and he describes the various forms of piles with considerable accuracy.

Piles are one of the penalties we pay for the erect posture. One of the chief reasons for this is the anatomy of the part. There are three main groups of veins, which all anastomose more or less intimately round the anal canal. The main plexus of veins lies immediately beneath the mucous membrane, between it and the muscular coat of the anal canal. The main artery of the rectum is the superior hæmorrhoidal, which runs down in the mesorectum, and divides at the upper level of the rectum into two branches, which run parallel with the wall of the bowel, and anastomose lower down with the middle and inferior hæmorrhoidal arteries, which come down from the iliac arteries and supply mainly the tissues outside the bowel wall. Of the three main groups of veins, the most important is the one running with the superior hæmorrhoidal artery. These veins run more or less up the bowel from this plexus and drain directly into the portal system. The inferior mesenteric vein is a branch of the portal system, not a branch of the inferior vena cava. On the other hand, the veins running with the inferior hæmorrhoidal artery and the veins running along the perineum drain into the systemic system through the inferior iliac veins. The portal vein contains no valves.

So it is obvious that in an ordinary human being standing upright there is a column of blood, the length of which is equal to the distance between the skin of the anus and the liver or the dome of the diaphragm. As there are no valves, there is a fair amount of pressure at the lower end of that column when the person is standing. The reason why we suffer from piles is because of the blood in this branch of the plexus having to go into the portal system. A further reason is that, obviously, anything in the way of congestion of the liver or anything which causes increased intra-abdominal tension, such as overloading of the bowel, will cause a certain amount of pressure on the inferior hæmorrhoidal veins.

Hæmorrhoids are generally divided into two main varieties—internal hæmorrhoids and external hæmorrhoids—though in many particulars these two varieties differ so widely, both as regards their symptoms and pathology, that they should be regarded as entirely separate conditions. Indeed, it is unfortunate that the two conditions should be described by the same name, since their pathology is quite distinct.

Internal piles are probably peculiar to the human species, and are the result of the erect position. External piles, though very rare in animals, do occur. I myself have seen dogs with a condition closely resembling the external piles of human beings.

Internal and external hæmorrhoids usually occur as separate diseases, but they are not infrequently found associated in the same individual.

Any condition which tends to produce venous engorgement of the rectal veins is a predisposing cause of piles. Thus, piles are said to be more common in hot climates than in the more temperate zones; and individuals who habitually eat and drink too much, and who live sedentary lives, are more prone to the development of piles than those who live a more active and temperate life.

Chronic constipation is a common cause of hæmorrhoids, because it results in pressure upon the pelvic veins, and so directly conduces to stagnation and engorgement in the hæmorrhoidal veins. For the same reason cirrhosis and congestive conditions of the liver, pelvic tumours, and pregnancy are common causes of piles.

In some individuals there is a congenital tendency to a varicose condition of the veins in the lower part of the body, and such individuals often suffer from hæmorrhoids sooner or later.

There is no particular age for hæmorrhoids, but they are most frequently seen during the middle period of life. Hæmorrhoids are rare in children, though by no means unknown.

EXTERNAL HÆMORRHOIDS.

There are two common varieties of external piles. One variety consists of tags or ridges of redundant skin round the margin of the anus. These skin tags are of little real importance, although they are always described as piles by patients, and not infrequently by doctors. They consist of little else than loose folds of skin, with perhaps some cellular tissue, and as a rule they cause slight, if any, inconvenience. I believe most of these skin tags result from previous attacks of the next variety—thrombotic external hæmorrhoids. Some are the result of previous operations upon the anal region; and they are occasionally seen in cases of pruritus ani of old standing.

The other and more common form of external piles is the thrombotic

or venous external pile. The predisposing cause in almost all cases i engorgement of the hæmorrhoidal veins. The exciting cause is usuall some kind of traumatism. A sudden strain during some form of exercis will often cause the formation of one of these piles. Straining at stoo is another common exciting cause. In fact, any action which causes a sudden increase in the intra-abdominal pressure, such as coughin sneezing, blowing the nose, etc., may, by the strain which it throws upo the veins in the anal plexus, produce an external pile.

These small thrombotic piles generally develop quite suddenly. The consist of small, circular, ovoid swellings at the anal margin, varying i



FIG. 35.—SKIN TAGS

size from a small millet-seed to a thing as big as a cherry. In colour they are livid or dark blue, the skin over them being smooth and shiny. They are usually single, but there may be two, or even three, at a time.

There is a difference of opinion as to their exact pathology. Some authors maintain that they are due to the formation of a thrombus within a varicose vein, while others believe them to be the result of the rupture of a small vein and extravasation of blood into the delicate cellular tissue of the anal margin, the blood forming a thrombus in the cellular tissue. According to the latter view, these small tumours are practically hæmatomata at the anal margin. Both conditions probably occur, but the

latter explanation is no doubt the correct one in most instances. These thrombotic piles often occur in what may be called "attacks." A patient often says that he has had several such "attacks," and not infrequently when one of these piles has made its appearance another will form soon afterwards. The attack usually starts by a slight itching or sensation of fulness in the parts, or sometimes a patient will say that while at stool he suddenly felt a sharp pricking sensation. In the course of twenty-four hours or so great tenderness is noticed, and on examination the patient feels a small and very tender swelling at the anal margin.

These swellings most frequently occur at the anal margin, but occasionally just inside the anus, where they are nipped by the sphincter muscle. In this latter situation they cause a great deal of pain from constant spasm of the muscle. Those at the external margin of the anus are often of considerable size. I have seen them as large as a walnut.

As a rule these thrombotic piles quickly become inflamed, and are acutely painful. The most characteristic symptom is pain, and this is often extreme, the patient being frequently unable to sit down on account of it, and being terrified of the bowels acting. Any action of the bowels is followed by great increase in the pain for some hours afterwards. The amount of pain which these small tumours can cause is quite remarkable. In some cases the inflammation becomes acute, and there is œdema of the surrounding skin, so that when examined a large inflamed œdematous swelling is seen all round the anus.

If left alone, these external piles, after causing a great deal of suffering for several days, usually subside, the swelling goes down, the tenderness passes off, and nothing but a tag of loose skin is left. Bleeding occurs if one of the swellings bursts as the result of attempts to return it into the rectum, where, of course, it does not belong. The cause of the extreme pain is the tension of the inflamed clot, and the resulting pressure upon the numerous nerve endings with which the skin of the anal margin is richly supplied. Sometimes the blood-clot becomes infected and is converted into a small abscess. This makes the pain worse, and may result in the formation of an ulcer or small fistula.

The indication in this form of piles is to relieve the tension, and the best way to do this is by operation. It is true that if left alone these piles will in most cases eventually subside, but this only occurs after prolonged suffering; and, on the other hand, they may result in the formation of a marginal abscess or fistula.

Treatment.—A great deal can be done by palliative means to allay the pain caused by external piles. A hot fomentation of the ordinary lead and opium lotion, applied as hot as it can be borne, and changed frequently, will as a rule relieve the pain. Any sedative application may be employed with advantage. It is a mistake to suppose that astringent

ointments, such as gall ointment, are the correct means of treating these cases. Astringent ointments do little or no good, and often increase the pain. The bowels should be relieved by some mild laxative, and violent purges avoided.

One of the most important factors is to insure cleanliness of the part, so as to prevent the blood-clot from becoming infected. The anus should be bathed frequently with hot water, to which a little antiseptic may be added. Some soothing ointment should be applied to relieve the pain, such as:

Morphine sulph ...	grs. v.
Ung belladonnæ ...	ʒi.
Ung. stramonii ...	ʒi.

or—

Ung. hydrarg subchlor. ...	grs. iv.
Extr opii ...	grs. ii.
Extr belladonnæ ...	grs. ii.
Lanoline ...	℥ss.

A lead and opium compress will often give great relief.

Rest is of great importance, and the more the patient lies down or refrains from walking about, the quicker will the inflammation subside. Hot baths are also most effectual in allaying pain.

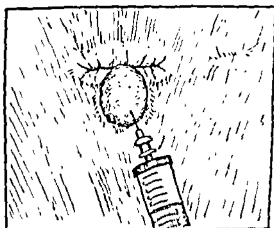


Fig 36.—Diagram showing Method of producing Local Anæsthesia for Removal of an External Pile.

By far the best method, however, of treating these cases is by cutting off the pile at once. This immediately relieves the tension, and the pain quickly subsides. The operation can be very easily performed, and although gas and oxygen anæsthesia is advisable in nervous or excitable patients, a general anæsthetic is seldom required. The anus should be well cleansed with soap and some antiseptic, and then about 5 to 10 minims of a 2 per cent. solution of novocain—or, what is better still, a solution consisting of novocain 2 per cent., adrenin 1 in 100,000—should be

injected along the base of the pile with a hypodermic syringe having a fine needle (see Fig. 36). About 20 minims of this latter solution should be injected slowly. It is therefore necessary to inject a sufficient quantity to produce a slight œdema of the tissues beneath and around the pile.

Anæsthesia having been produced, the pile should be seized in a pair of toothed forceps and cut off, either with the scissors or with a bistoury. Only about two-thirds of the pile should be removed, and the clot should then be turned out. The resulting wound is a small, flat one, and if

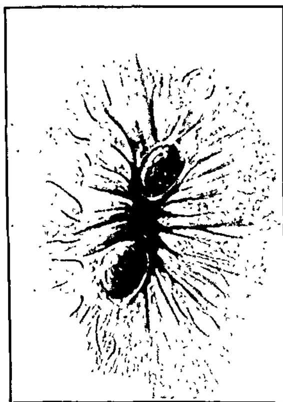


FIG. 37.—EXTERNAL PILES.

kept clean will soon heal without much trouble. The anus should afterwards be bathed several times a day with some antiseptic lotion such as carbolic acid, and a dressing should be kept over the anus with a T-bandage until the wound has healed. It is usually advised that the pile should simply be laid open and the clot turned out. The result of this, however, is that afterwards the remaining skin becomes swollen and inflamed, and but slight relief follows. It is much better to cut the pile off; the relief is almost immediate, and the wound heals more quickly than if the pile is merely laid open. If the operation is performed in

this way it should cause the patient no pain, and there is a great saving of time as compared with the palliative treatment.

Sometimes the skin tags first mentioned become inflamed and cause pain, or they may be the cause of itching and discomfort at the anus. In this case they should be snipped off with scissors under local anæsthesia after the parts have been cleansed.

In performing these little operations upon the anus, success largely depends upon the careful cleaning of the skin beforehand, as for any surgical operation. It is too often assumed that because it is almost impossible to keep a wound close to the anus permanently clean, it is unnecessary to clean the skin before making the wound. This is altogether a mistake; if the wound is made through clean skin, and kept clean for some hours after it has been made, it seldom becomes infected.

INTERNAL HÆMORRHOIDS.

Internal hæmorrhoids are vascular tumours situated in the lower portion of the rectum. They vary considerably both as regards size and appearance, and are often divided into three varieties—arterial, venous, and capillary hæmorrhoids. There is, however, no very hard-and-fast line to be drawn between these different varieties either as regards their symptoms or treatment. In some cases they consist mainly of tortuous veins, and have a bluish tint on inspection. Such hæmorrhoids constitute a true varicosity. In other cases the structure approximates more nearly to erectile tissue, and, on section, arteries of considerable size can be seen in them. The capillary variety is smaller than either of the others, is usually sessile, bleeds very readily, and is frequently situated somewhat higher up than the other two varieties. These capillary hæmorrhoids are often compared to arterial nævi.

Internal piles are an extremely common malady. It is impossible to ascertain the exact proportion of people suffering from piles, but Allingham, who had considerable experience, estimated that at least 50 per cent. of the population, male and female, had had piles at some time during their life. Of course, everybody does not have them sufficiently badly to need operation, but a large proportion of people, especially those living in cities, suffer from piles more or less severely. There is no special age at which they occur, though they are unusual in children. The youngest case I have seen was a boy of two years old; I have also seen the condition at six, eight, ten, and twelve years of age.

Piles occur mostly after twenty-two years of age, when people lead their most active life. But old age is not in the least exempt, and I have seen them in men as old as eighty.

I do not think there is any essential difference in their incidence in

males and females. The majority of patients at special hospitals, such as St. Mark's, are men. But that occurs in regard to all rectal diseases, and at St. Mark's Hospital there are twice as many beds allotted to men as to women. I do not, however, think that shows that the trouble is more common in men; it simply means that women are shy about saying that they have anything the matter with them in that region; and a further reason is that most women with the condition prefer to go to women's hospitals. In private work there does not seem to be any great disproportion between the sexes. Women are particularly liable to suffer from piles at certain times, especially during pregnancy and immediately afterwards.

Occupation has an important bearing on the development of piles. The most important is a sedentary life. People in active occupations are less liable to them, because their circulation is necessarily more vigorous. Still, people of an active life are not by any means exempt from piles, and a large number of officers in the Army and Navy suffer from them.

In sedentary occupations there is no doubt that constipation and excessive feeding are among the main causes for piles. Heredity has a very important bearing upon piles. I remember operating upon four members of one family, two brothers and two sisters, all for piles, and all of about the same age. And one of those patients told me that all the living members of the family had been operated upon for it. I have had several other families in which it was equally common. The predisposition to varix and piles seems to go together; some members of the family will develop varicose veins, and the others will have piles.

Certain drugs help to produce piles, and one of the most important of these, in my opinion, is calomel; this drug often causes the symptoms for which the patient has to seek advice. I know of many cases in which patients have had slight internal piles which practically gave them no trouble until someone gave them a dose of calomel, and after that, for two or three weeks, they suffered great inconvenience from piles. I have certainly seen cases where bleeding was brought on by calomel. Aloes is also sometimes responsible for the same thing, as are many of the other more violent cathartics.

There is one cause of internal hæmorrhoids which deserves special mention; for if overlooked, as it too frequently is, it may result in most serious errors in treatment. I refer to piles which are the result of obstruction to the venous return from the hæmorrhoidal veins by new growths. Just as a varicocele may develop as the result of sarcoma in the kidney, so may hæmorrhoids develop in consequence of malignant disease of the liver, or pelvis, or upper portion of the rectum. Cirrhosis of the liver and other conditions which cause obstruction to the portal

circulation often cause hæmorrhoids in the same way. It is most important to bear this in mind, as no form of treatment which is directed simply to the hæmorrhoids can do otherwise than fail. Operations upon such cases of hæmorrhoids are more than likely to be total failures, quite apart from the fact that if malignant disease is the cause of the hæmorrhoids, the diagnosis has been missed at the time when radical treatment might have been possible. We should always be particularly suspicious of some such cause for the hæmorrhoids when they have developed rapidly in a subject previously free from such trouble, and especially if the patient is elderly. It cannot be too strongly insisted upon that no case of hæmorrhoids should be treated without first making a digital examination of the rectum, and in many cases an examination of the abdomen as well.

Internal hæmorrhoids seem particularly common in men who have to do much riding, especially when they are in the saddle for many hours



FIG 38.—PHOTOGRAPH OF CASE OF STRANGULATED INTERNAL PILES.

and are in hot climates. A considerable number of cases of hæmorrhoids occurred among the officers and troops in the late war. It is a little difficult to see how exercise, even if carried to excess, should cause piles. It seems probable that the irregular dietary and habits which are inseparable from a military campaign were the real cause of so many men suffering from piles during the late war; certainly the number of men invalided to the base for piles was very considerable.

Constipation is certainly the commonest cause of internal piles; even when it is not the direct cause, it is certainly the predisposing cause in the vast majority of cases, and without it most of the other causes mentioned would be quite ineffective in producing piles.

The overloaded sigmoid flexure, which is the condition constantly present when a patient is suffering from constipation, causes pressure upon the pelvic veins and engorgement of the venous plexuses around the rectum and genital organs. Owing to the looseness of the cellular tissue surrounding the rectum, the rectal venous plexuses are but poorly

supported, and thus engorgement of the rectal veins and the formation of piles easily follow.

The natural course of events is for the bowels to be emptied in the morning, so that the loaded sigmoid is not pressing upon the pelvic veins during the day while the individual is in the erect position. Many persons, however, habitually neglect this natural preventative against the formation of piles by not making it a custom always to empty the bowel before going about the day's duties.

Another way in which constipation tends to produce piles is by the straining at stool in which it usually results. Constant and habitual straining in time causes partial prolapse of the mucous membrane, and tends to produce a varicose condition of the lower rectal veins.

Finally, when piles have formed, constipation and consequent straining markedly aggravate the condition and accentuate the symptoms. An attack of diarrhœa has a similar effect when piles are present.

It has been stated that spasm and hypertrophy of the sphincter muscles may be the cause of piles in some cases, and elaborate theories have been propounded to account for this. Personally, I cannot believe that any spasm or hypertrophy of the sphincter muscles can possibly give rise to internal piles. But there can be no doubt that a hypertrophied sphincter greatly aggravates the symptoms. When piles are associated with a hypertrophied sphincter, stretching the muscle will in many cases entirely relieve the symptoms, if not permanently, at any rate for the time; and as from the patient's point of view piles, apart from symptoms, are of no consequence, a cure of his trouble may result from this procedure as far as he is concerned.

If well-marked piles are present, however, no real cure can possibly result from stretching the sphincter.

Symptoms.—In uncomplicated cases the symptoms of internal hæmorrhoids are chiefly bleeding and prolapse. The amount of bleeding which occurs varies very considerably in different cases. Sometimes the patient says there has never been any bleeding. This may be due to the fact that the patient is accustomed to evacuate the bowels in some dark closet, and consequently has failed to notice it. But patients may present themselves for treatment on account of prolapse who have never suffered from hæmorrhage. Hæmorrhage probably occurs in nearly 85 per cent. of all cases of piles, although it is probably not very profuse in half that number. On the other hand, hæmorrhage may be so profuse as to threaten the patient's life. Quite recently a man came to St. Mark's Hospital who looked as if he were in the last stages of pernicious anæmia, and this condition was entirely due to the blood which he had lost from hæmorrhoids.

A cavalry officer upon whom I operated recently told me that he was

once stopped by the police for cruelty to his horse, and on his asking the reason the policeman pointed to the horse, whose hind-quarters were streaked with blood. The blood, however, belonged to the officer, and came from his hæmorrhoids.

Prolapse.—This is generally a late symptom of piles. Apart from severe bleeding, it is the chief symptom which obliges patients to seek medical advice. It is prolapse which causes pain in cases of piles. As soon as a pile begins to come outside the sphincter, it is liable to injury from friction and to become strangulated by the sphincter muscle. Often a pile which only comes partly down will cause great discomfort by the continual irritation of the muscle which it produces.

Prolapsed piles may produce trouble from the slight leakage of mucus which results from them. This mucus keeps the skin damp, and it is liable to get rubbed and set up an eczema. It also causes the patient annoyance by staining his linen.

When strangulation of the piles occurs, or when a large mass of piles comes down and cannot be made to stay up, the pain and discomfort become so severe that patients have to seek surgical treatment.

Pruritus.—Another symptom which is sometimes met with is pruritus. In many cases this is the first symptom. I think the mechanism of it is as follows:

A small internal pile comes partly down and prevents the sphincter from entirely closing. Owing to its presence mucus from the exposed mucous surface collects around the skin of the anus and sets up irritation. Most cases of pruritus have some dampness just around the anus, and this is sometimes due to one of these internal piles. Removal of the pile, so as to make sure of keeping the parts dry, will often cure the pruritus.

Neurosis.—I saw a patient some time ago who complained that he could not sit down, and when I saw him he stood up the whole time. When riding in his motor-car he always stood up, and his wife told me he used to eat his meals off the mantelpiece. He appeared to have developed into quite a nuisance. He had an extraordinary history; he was very neurotic and looked almost melancholic. There was nothing the matter with him except slight internal piles. When they had been removed he got all right.

One sees extraordinary cases of neurosis with piles. Not long ago I was consulted by a clergyman who had been practically a melancholic for four or five years, and had actually spent nine months in a lunatic asylum as a melancholic. He had had to give up his living, and was unable to do anything. Some people thought he would be better for having his piles removed, though they were afraid the operation might send him out of his mind again. I operated on his piles, and he got quite well, though I did not think he would do so. The piles had been the chief

cause of his worry, and after their removal he put on 1½ stone in weight within a few months, and became quite a rational person.

Pain.—Pain is not a characteristic symptom of internal piles, though a considerable amount of discomfort is common. Pain is only present when the piles have become strangulated, or when, from constant protrusion, they have become ulcerated as the result of friction with the clothes or of the patient's efforts in replacing them. Women with internal hæmorrhoids not infrequently complain of a bearing-down pain in the rectum, and a feeling as if the bowels had not been properly emptied.

The degree and severity of the symptoms complained of by patients with internal piles vary considerably in different cases, and as a rule the variations depend more upon the individual patient than upon the condition of piles present. It is, indeed, quite remarkable that in some cases a patient will present himself for treatment on account of piles, and will complain of but slight symptoms, when, on examination, he will be found to have an extreme degree of prolapsed hæmorrhoids, which it seems hardly believable any individual could possibly endure while walking about. I repeatedly see patients at St. Mark's Hospital who have presented themselves for treatment with a mass of strangulated and ulcerating piles nearly as large as one's fist protruding from the rectum, and yet they have walked up to the hospital. On the other hand, one often sees highly sensitive persons with a comparatively slight degree of piles whose life is a misery to them, and who can think of nothing else but the condition of their anus.

Referred Pain.—Pain from piles may be referred to different places. Among the common places are the bladder or the testicle in men, or the uterus in women. Sometimes there is difficulty in passing water, or there may be sciatica. There are cases which have been called sciatica, but in which I believe the pain has been due to piles. Pain in the back, so-called lumbago, is a common symptom. Pain from other parts may be referred to the rectum, and the other day I saw a lady who came to me with a pain in the rectum, which her medical attendant thought was due to piles. On examination I found that she had commencing carcinoma of the cervix, and nothing the matter with the rectum.

Another disease which rarely imitates piles (there is about one case a year at St. Mark's) is commencing tabes or disseminated sclerosis with rectal crises. I have seen altogether about four such cases. The patient complains of a good deal of pain after defæcation, but there is nothing else the matter. Nothing wrong is found in the rectum, but careful examination will show Argyll-Robertson pupils and commencing symptoms. There is some anæsthesia along some of the sensory nerves, and either loss of knee-jerks or very exaggerated knee-jerks. The rectal crises occur in the early stages of tabes dorsalis.

Pathology.—Piles are small swellings or tumours at the lower end of the rectum, consisting of dilated bloodvessels covered with mucous membrane, and held together by loose connective tissue.

On section, they are seen to consist of a number of dilated venous cavities cut across in different planes. There is also often an increase in the number of arteries. The walls of the dilated vessels which form the partition between the different venous spaces are very thin. After piles have existed for some time they undergo a considerable amount of change in their structure. The mucous membrane covering them becomes much thickened, and the histological character is often much changed. There is also a tendency to the formation of fibrous tissue in old piles, due to injury and partial thrombosis. When thrombosis occurs as the result of strangulation of the pile mass, the pile becomes much swollen, and there is œdema in addition to the thrombosis. Surface gangrene is also quite commonly seen, the point at which this occurs being generally on the lowermost part of the pile towards the lumen, which is the part farthest removed from the blood-supply.

Complications of Piles.—Anæmia is certainly the most common complication for a case of internal bleeding piles, and a slight degree of anæmia is very common. It is not so much the quantity of blood lost at a time that produces anæmia as the frequent small loss over a long period.

Slight paleness of the lips, eyelids, and gums will often be found when looked for. Also, the patient often complains that walking upstairs brings on faintness or palpitation. A blood-count will often show quite a marked degree of anæmia, and I have on several occasions seen patients who gave on test a blood-count showing one-quarter of the normal amount of red blood-cells; this is, of course, a very grave degree of anæmia.

Actual death from anæmia caused by bleeding from piles is not unknown. I have seen one such case at St. Mark's Hospital.

Apart from this, serious anæmia renders what would otherwise be a perfectly simple operation into one accompanied by considerable risk. When one has to treat a patient with a really serious degree of anæmia from internal piles, the patient should be confined to bed and transfused with human blood from a suitable donor, so as to get him into a better condition before attempting operation.

It need hardly be pointed out that very special care to avoid bleeding during the operation, shock, etc., must be taken under such circumstances.

One of the most common complications of internal piles is strangulation. This is always liable to occur where the piles come down outside the sphincter. Such patients often have a history of several attacks of strangulation from which they have had to lie up in bed, often for several weeks. Strangulated piles may be exceedingly painful, and if the piles actually slough abscesses may form, or other septic complications. The

treatment for strangulated piles is referred to on p. 87. As a rule, the inflammation produced by strangulation of the piles gradually subsides in the course of a week or so without any serious consequences. Rarely, however, there are serious consequences, and even a fatal issue may result. I have seen one case of death from strangulated piles, and I think it is of sufficient interest to give in detail.

Case.—The patient, a man aged forty-three, was admitted to St. Mark's Hospital for internal piles. He had suffered from piles for about twenty-five years, and had had several attacks of strangulation which had completely incapacitated him. He was much afraid of operation, and had put off coming to hospital on that account. Two days before admission he had a severe attack of strangulation with much pain. On admission he was found to be suffering from strangulation of several large piles. He was very anæmic, and there was slight œdema of both feet. He was also short of breath. An examination of the chest showed some œdema at both bases; his heart was dilated and the liver somewhat enlarged. The urine was normal. An examination of the rectum showed considerable swelling round the anus and several prolapsed piles. As the parts were very tender he was examined under an anæsthetic, and it was found that all the veins of the rectum were thrombosed some 2 or 3 inches up the bowel, and there was considerable œdema of the rectal mucous membrane.

The patient was treated with hot fomentations, rest, etc. Five days after admission there were signs of sloughing of the rectum and an abscess formed. The whole of the rectum was found to be gangrenous for 4 or 5 inches. The patient became very ill, with a pulse of 110 and a temperature of 99° to 101°. Eleven days later a slough which consisted of almost the entire rectum was passed. There was also much sloughing and œdema of the buttocks, and the patient became tender over the liver and complained of abdominal pain. In three weeks two very serious hæmorrhages occurred, and the patient died from septicæmia and general weakness.

A somewhat similar case is reported by Dr. Alexander. His patient got pyæmia following a gangrenous strangulated pile with thrombosis of the abdominal veins, abscess of the liver, and secondary abscesses in other parts of the body. This patient, after a very severe illness, ultimately recovered.

Strangulated internal piles may be very serious, as they may cause septic thrombi and abscess of the liver. Not long ago I was called upon to open a large abscess in the left iliac fossa of a gentleman who had a strangulated thrombosed pile. He was very seriously ill, but recovered after the abscess was drained.

The most extraordinary case of strangulated piles I have ever seen occurred recently at St. Mark's Hospital.

Prolapsed Hæmorrhoids of Record Dimensions.—This patient, a man, was admitted to one of my beds at St. Mark's Hospital with strangulated prolapsed hæmorrhoids. The swelling was so huge that it was thought at first to be a case of prolapse of the rectum. On examination it was obvious that it was simply three enormous prolapsed piles. I have never heard of or seen anything approaching the size of the tumour that occurred in this case. The mass was nearly as large as a soup-plate, and actually produced ulceration of the buttock through pressure. It seems difficult to account for the enormous size that the hæmorrhoids reached, but the largest was 4½ inches in diameter. Undoubtedly the whole mass would have become gangrenous but for the fact that the sphincter gave way, thus preserving the blood-supply. The patient was treated by simply raising the lower end of the bed for a week, but it was then seen that the swelling was not going down, and it was decided to operate. I removed the piles by the ordinary method of ligature, and he made quite an uneventful recovery, except that the tremendous stretching of the sphincter necessitated further operation to shorten the muscle. He is now perfectly well and normal.

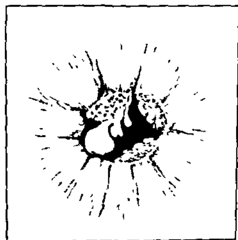


Fig. 39.—Polypus growing from an Internal Pile

Degenerative Changes in Piles.—In some cases where internal piles have existed for a long period of time there is a tendency for them to undergo degenerative changes, and become converted into fibrous tissue. What probably happens is that at some time or other, in consequence of strangulation or partial strangulation, thrombosis of the pile occurs, and as a result it is slowly converted into fibrous tissue. In course of time, owing to the frequent attempts on the part of the bowel to expel the mass, the pedicle becomes elongated, so that eventually the pile is converted into a fibrous polypus. Such polypi may reach a considerable size, and I have seen them as large as a walnut. In some cases only the extremity of the pile undergoes the change, so that we see an ordinary internal pile with a fibrous polypus at its free end. Such a condition tends to increase any prolapse which previously existed, and to render the pile polypoid in character (see also under Innocent Tumours of the Rectum, p. 270).

TREATMENT OF INTERNAL HÆMORRHOIDS.

The treatment of internal hæmorrhoids is usually divided into palliative and operative. The word "palliative" is here used in its true sense, for with but few exceptions no treatment by local applications or medicaments will cure internal hæmorrhoids. Palliative treatment will often relieve the symptoms, and, if persisted in, will sometimes keep the patient free from discomfort for a considerable time; but a cure of the condition by such means is only possible in a few exceptional cases.

It is necessary to distinguish clearly between a cure of the piles and a cure of the symptoms. The latter is often possible, at any rate for a time, by suitable and carefully carried out palliative treatment, but a real cure by palliative measures is very seldom possible.

Apart from the fact that a cure of the piles cannot be effected by palliative treatment, there is but little advantage in such treatment. It is tiresome, and has of necessity to be continued for a long time; and as a rule the patient has ultimately to submit to an operation which, had it been performed at once, would have saved much time and worry. Nothing is to be gained by waiting or by a trial of palliative measures when a patient has well-marked internal hæmorrhoids.

There are, in my opinion, only two methods of treating piles which are worth serious consideration—namely, injection and removal by operation. Piles, once really formed, cannot be permanently got rid of by local applications, and the symptoms will certainly recur again, and the condition will progress slowly but surely even in spite of persistent treatment. Such treatment often results in the patient spending many hours a week in treating his piles and introducing medicaments, in his giving up many of his favourite habits and vices, and in time often results in reducing him to a condition of chronic slavery to his rectum. In these days it is absurd for anyone to put up with such a state of things, when he can be easily cured with the maximum of safety and the minimum of inconvenience.

In some cases of venous hæmorrhoids, when the condition is due to a congested state of the portal system, a great deal of relief, if not an actual cure, can be effected by removing this congested condition by suitable treatment. But this only applies to those cases where there is little or no prolapse of the hæmorrhoids, and where there has not been much bleeding. If either of these symptoms is present to any marked degree, non-operative treatment will only tide over the trouble.

In cases where there is well-marked cirrhosis of the liver or other co-existing disease, which either contra-indicates an operation or renders its complete success improbable, palliative treatment should be adopted,

and an operation should be performed only if the symptoms are severe, and other forms of treatment are ineffective in affording relief.

Palliative measures should be tried in pregnant women who are suffering from internal hæmorrhoids; but if there is severe bleeding or great pain, operation or injection must be resorted to, and as a rule there is little fear of a miscarriage. It is a mistake to suppose that the condition of profound anæmia sometimes produced by constant bleeding from hæmorrhoids is a contra-indication to operation. On the contrary, transfusion and an immediate operation affords the best means of preventing the risk of a fatal issue and of removing the cause of the anæmia.

A good plan is to tell the patient to inject some cold water into the rectum night and morning with a 6-ounce rectal syringe. Tincture of hamamelis may with advantage be added to the water in the strength of 1 drachm to the pint.

If ointment is used, it should be introduced well into the rectum with an ointment introducer, or, what is better, the ointment should be ordered in a collapsible lead tube to which can be screwed a short bone

FIG. 40.—OINTMENT INTRODUCER.

nozzle with lateral openings. This is introduced into the rectum, and some of the ointment is squeezed out as the nozzle is being withdrawn.

The following ointments and suppositories are recommended:

℞ *Extract suprarenalis* ... ... ʒii.
Olei theobromi ... ... ʒvii.
Fiat suppositoria.

℞ Ichthyol }
Tannic acid } ... ... āā grs. v.
Extract belladonna }
Extract stramonium } ... ... āā gr. j.
Extract hamamelis ... ... grs. x.
Fiat suppositoria.

℞ Ung. acidi tannici ... ... ʒiv.
Ung. stramonii }
Ung. belladonnæ } ... ... āā ʒi.

Treatment by Injection.—This method of treating piles dates back to the nineties. It was extensively practised in America by quacks and so-called "pile curers," who did a very extensive business. Although good results were obtained, serious complications quite frequently occurred as might naturally be expected, seeing that the treatment was being

carried out by quite unskilled persons, and for this reason it got into bad repute. It was tried out, however, at St. Mark's Hospital, where the results were found to be good, and it has been in use there on and off ever since then. Of late years there has been a very considerable revival of the treatment, and it is now very extensively practised, both here and in America.

The great advantage of this method of treating piles is that the patient is not obliged to lie up or seriously alter his daily life. The treatment has a definitely restricted use, and should never be employed indiscriminately, as is too often the case. It is quite unsuitable where the piles are very large, or where they prolapse very readily. It is not suitable where there is severe hæmorrhage, or where there are complications, such as fissure, polypus, fistula, etc. Further, it is wrong to promise the patient that he will be cured, for in about 80 per cent. of cases recurrence occurs in the course of a few years. This is, however, not serious, as the treatment can be repeated. I have some patients who come back regularly every two or three years for further treatment, and have been doing so for at least fifteen years.

The treatment is suitable in the following cases:

1. In old people where it is not advisable to perform an operation, or in whom the administration of an anæsthetic of any kind is contra-indicated.

2. In patients suffering from some disease or condition which renders it highly desirable that they should not be laid up or undergo an operation.

3. In women in an advanced state of pregnancy.

4. In men suffering from troublesome piles, who on account of business or for other reasons, are unable to spare the time to undergo an operation.

It is not as good a method of treatment as by operation, and the results are nothing like so permanent. It is now enjoying a wave of popularity, but I think will once again become unpopular, partly because some of its advocates claim too much for it, but chiefly because it seems so easy that persons who have no special knowledge of rectal complaints start treating patients by this method, and in consequence there are serious complications and disasters, which tend to bring the method into disrepute.

The treatment is nevertheless a very satisfactory one, and gives most excellent results if properly carried out and if used in suitable cases. I have used this method of treating piles since I first became a surgeon to St. Mark's Hospital twenty-eight years ago, and have treated many thousands of cases by this means. It has its proper place in the treatment of piles, but it is not, and never will be, the universal panacea for piles that it is too often claimed to be.

As a rectal surgeon I, not unnaturally, am often consulted by patients

when things have gone wrong from the injection treatment, and during the last few years I have been frequently consulted on this account. I have seen a considerable number of quite bad complications due to the treatment. Several cases of fistula due to sloughing of injected piles were brought to see me, and two of these proved extremely troublesome to cure. In most of the cases a localized slough or a submucous abscess was the trouble, and was not serious. Most of the complications were due to careless technique, and the use of wrong solutions, or attempts to cure cases which were quite unsuitable for the treatment. I know of one patient who died from gas gangrene following an injection for piles, but this is the only death that I have knowledge of in recent years.

The method requires considerable skill and the technique is not easy, as no two cases are alike, and it cannot be learnt from book descriptions.

Technique of Injection.—There are two methods of injecting piles. One is by means of what is known as the strong solution, and the other by means of a weak solution in oil. The latter is now the most popular and, in the majority of cases, the best.

The Solution.—The weak solution consists of a 5 per cent. solution of carbolic acid in almond oil, with an addition of 2 grains of menthol to the ounce. It is recommended that the solution should be prepared as follows: Pure carbolic is melted by warming the bottle, and 12 ounces of the solution are poured into a large measure, to which 12 ounces of warm almond oil are then added, 1 ounce of menthol crystals being stirred into the mixture. This makes up a 50 per cent. solution, and from it a 5 per cent. solution can be made by diluting 1 ounce of the stock solution with 9 ounces of almond oil.

The strong solution consists of:

Liquefied carbolic	24 minims
Glycerine	2 fluid drachms
Distilled water	2 „

This makes a 10 per cent. solution.

These two solutions are all that is necessary to treat any case by injection.

The Syringe.—A special syringe is required in order that it may be used through a speculum and that, in the case of the oily solution, oil can pass easily through the needle. The syringe usually used is a glass barrel syringe with a capacity of 3 c.c., and having a long needle with a shank ¼ inch from the end and fitting on to the syringe by means of a bayonet catch (see Fig. 41). For using the strong solution a long narrow syringe holding up to 10 minims is used (see Fig. 43). Both syringes should be fitted with ring handles, so that they can be easily held in the right hand.

The Speculum.—The piles should always be injected inside the rectum, and it is necessary to use some suitable form of speculum to reach them. I prefer to use a short tubular speculum (see Fig. 42), and this is also the pattern used at St. Mark's Hospital. Some surgeons prefer to use a fenestrated speculum of the Brinkerhoff pattern with a window covered by a slide at one side. The speculum, having been warmed and lubricated,

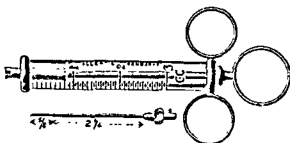


FIG 41.

is inserted into the rectum and the piles examined. The speculum is then pushed a little farther in, and the injection is made under the mucous membrane in the area above the pile that is to be treated. The injection should not be made into the pile, but into the tissues above it. The point of the needle is inserted just under the mucous membrane, and the piston

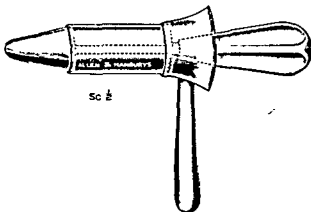


FIG 42.—SPECULUM FOR INJECTING PILES

of the syringe is then gently pushed down. The tissues should be seen to swell up at once.

The amount of the solution varies from about 2 to 5 c.c. of the 5 per cent. solution. The surgeon watches the pile during the injection, and it should be seen to swell up as the injection is inserted. If the injection is properly made, a large swelling will gradually appear with fine venules running over the surface. If the swelling does not occur, it means that

the injection is being made into one of the veins and the syringe should be withdrawn and the injection restarted elsewhere. If a white spot is seen to appear round the point of the needle and to spread, the injection should be stopped immediately, otherwise there will be a slough formed. It is always wiser to err on the side of injecting too little than too much, especially in the case of a patient who has not had a previous injection given him. After the injection has been made the needle should be withdrawn, and any excess of carbolic acid that has escaped should be wiped away with a pledget of cotton-wool, and with a small pledget of cotton-wool on the end of a suitable forcep the swelling should be gently pressed up while the speculum is removed. No medicant of any kind should be used, and the patient can immediately get up and go about his business. He should, however, be warned not to stand about more than necessary, and not to take violent exercise for a couple of days. The injection should not be repeated at intervals of less than a week.

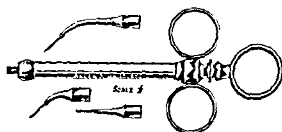


FIG 43.—SYRINGE FOR THE TREATMENT OF PILES BY INJECTION.

The object of the injection is to introduce fluid into the cellular tissue beneath the mucous membrane and not into the veins. The fluid getting into the veins will not cause any harm, but, on the other hand, it will not do any good to the pile. The amount injected varies with the size of the pile, and, of course, with the strength of the solution used. There is no rule; it will depend entirely on the judgment of the operator. On no account should any solution stronger than 5 per cent. be introduced under the mucous membrane.

With a stronger solution the technique is somewhat different. The needle is plunged into the middle of the pile near its base, deep from the mucous membrane. The point is then very gently withdrawn a little way and the injection started. The pile should be seen to visibly change in appearance, although, of course, there is no such large swelling as with the weak solution under the mucous membrane. When the injection is being made the point of the needle should be gently withdrawn so as to distribute the solution through the substance of the pile, especially near its base—that is, where it is attached to the bowel wall. The amount of 10 per cent. solution injected should not be more than 8 to 9 minims.

and with a very strong 20 per cent. solution should not be more than 3 to 5 minims.

I believe the 5 per cent. solution gives the most rapid results and the least amount of discomfort to the patient, but in a difficult case, in order to get completely satisfactory results, it is generally advisable to give some deeper injections with a strong solution before a cure can be assured. A combination of both methods often gives the best results. It is important to bear in mind that with both methods it is essential that the solution should be injected into the cellular tissue between the vessels, and not into the bloodvessels themselves.

The late Mr. Graeme Anderson and Dr. Cuthbert Dukes made a study of the pathological changes which are provoked by carbolic acid injections at St. Mark's Hospital, and summarized their conclusions as follows:

"Carbolic acid, being a powerful irritant to the tissues, initiates an aseptic inflammation, characterized by dilatation of the vessels, emigration of leucocytes, and transudation of lymph. By these means the alien liquid is diluted and removed; thereafter the inflammation quickly subsides. All the changes observed microscopically represent the effort of the tissues to repair an injury.

"The curative effects of injections of carbolic acid do not depend upon any specific action of this chemical substance. The mere introduction of a needle into the hæmorrhoid results in damage to many bloodvessels, and in these thrombosis is likely to follow. Moreover, the cellular injury which this poison inflicts on the delicate lining cells of the capillaries is also likely to contribute to intravascular clotting. It is possible also that the contraction of newly formed fibrous tissue may constrict bloodvessels or even occlude them, but little sign of this was noticed in this histological study. Perhaps, after longer periods, this would have been more evident.

"The early inflammatory changes which occur in the first three days do not play any important part in the cure of hæmorrhoids; it is the secondary changes, in particular the intravascular clotting, and subsequent fibrosis, to which any beneficial effect must be ascribed."

It has been suggested that the treatment, since it acts by producing a thrombosis in the venous plexus, might result in infarction of the lung from displacement of the clot. It is possible that this does occur occasionally, but since the clot will be in the portal vein it cannot reach the heart or lungs, but goes into the liver, where a small aseptic clot will do no harm. This is one reason why only solutions which are strongly antiseptic should be used. With such a powerful antiseptic as 5 or 10 per cent. carbolic there is no fear of sepsis unless local sloughing is produced, but if a solution which is irritating without having powerful antiseptic qualities is used, there might be.

Contra-indications to the Injection Treatment.—The success of the injection method depends partly upon careful technique and partly upon the careful selection of cases suitable for the treatment. The following are, in my opinion, contra-indications to the injection method:

1. Extensive prolapse, especially if the patient is not able to keep the prolapse back when walking or standing.

2. Other complicating conditions, such as fistula or fissure.

3. If the piles are strangulated or inflamed.

4. If there are large external skin tags. It is not likely that the patient will be comfortable unless these can be got rid of, and they cannot be dealt with by injections.

5. If the patient is young, under forty, and living abroad, or likely to be abroad for long periods.

6. If there are any polypi present. The treatment cannot be successful without their removal.

The results of this treatment are often very satisfactory when it is used in suitable cases. It must not, however, be looked upon as a radical cure, for in quite a number of cases the relief afforded is not permanent, and after the lapse of a few years the old condition recurs. In spite of this, however, many patients will, for the reasons already given, prefer this treatment to undergoing an operation, and it is admirably adapted for those cases in which an operation cannot be performed. Moreover, there is no difficulty in repeating the treatment should the pile recur at a later time.

If properly carried out the treatment by injection should be quite safe, and there should be no complications of any consequence. Pain or slight discomfort lasting a few hours may occur, but in my experience is never serious. The formation of tissue, abscess, or fistula may result, but is almost certainly due to inexpert treatment. The swelling which results from the injection, and which is quite normal, is often considerable, and for this reason it is never advisable to inject more than one pile at a time or to inject at too short intervals. The patient should always be warned not to take violent exercise for forty-eight hours after the injection, as it may cause trouble. P. G. McEvedy mentions temporary unconsciousness as having occurred after injection, and also describes a condition resembling influenza accompanied by a temperature of 100° to 101° occurring as the direct result of injections. I have had one well-marked case of this condition, and was able to prove that it was due to the almond oil, as it always occurred in this patient when the oil was used, and did not occur when glycerine was substituted for the oil. Such patients are extremely sensitive to almond oil. This complication is not serious, and if noticed the solution should be changed to carbolic acid in glycerine.

The Treatment of Piles by High-Frequency Electricity Currents.—This treatment consists in applying high frequency by means of a glass electrode introduced into the anus. The treatment is based upon no scientific principle, and although it has been much lauded as a means of treating internal piles by those interested in electrical treatment, my personal view is that it involves a waste of time and money. I have never seen a case in which anything more than slight temporary relief followed the use of the high-frequency current in a genuine case of internal piles, and it has always seemed to me that the relief which did result was to be attributed to the slight dilatation of the bowel produced by the use of the electrode rather than to any direct effect of the current. Patients should certainly be warned against those who promise to cure internal piles by means of electricity.

Treatment of Complicated Cases of Piles—*Prolapsed and Strangulated Internal Piles.*—It may happen that one is called in to see a patient whose piles have prolapsed and cannot be returned. This is a condition which calls for immediate treatment, as not only is it very painful, but strangulation and sloughing of the prolapsed mass will probably occur unless the piles can be replaced at once.

One of the best methods of treating such a case when it can be properly carried out is to administer an anæsthetic and stretch the sphincter carefully, the fingers being passed through the prolapsed mass, and the sphincter gradually and fully dilated above it. The prolapsed piles should be cleaned and pushed back into the rectum, which will be an easy matter after the sphincter has been stretched. A suppository of adrenalin or hamamelis should then be placed in the rectum, and a firm pad applied over the anus.

The alternative practice, which should be carried out if an anæsthetic is not available or possible, is the following: The patient should be placed on the left side with the knees well drawn up. The prolapsed mass should then be carefully cleaned and a piece of wool soaked in adrenalin applied to it. A little cocaine may be added to the adrenalin, but it is not safe to use much, as the cocaine may be absorbed and cause unpleasant symptoms if applied freely to so large a mucous surface. It is better not to apply ice to the prolapsed mass, as is often done, as there is danger of producing gangrene. After the congestion has been to some extent relieved by this treatment, reduction should be attempted. The central portion or apex of the prolapse should first be returned, and later the base or peripheral portion. The subsequent treatment is the same as above (see also under Procidentia). In any case, the piles should be subsequently removed by operation at the earliest convenient date, as the condition is almost certain to recur.

In many cases considerable time can be saved to the patient by pro-

ceeding at once to remove the piles by radical operation. If the piles are sloughing, the operation should be performed with the clamp and cautery, so as to prevent any possibility of infecting the wounds. It is a mistake to wait until the inflammation has subsided, as there is no increased risk in operating at once, and it saves the patient much pain, and shortens the time before he is well again.

It is wrong to leave the piles to cure themselves by sloughing. If this is done, the consequences are most unsatisfactory, and ulceration or fistula is very apt to result from such treatment, not to speak of the amount of pain to which such a course condemns the patient.

I have always made it a practice to operate at once upon sloughing and strangulated piles, unless some other contra-indication existed. The result in all cases has been an immediate relief of pain; and as a rule the patient has been quite well again in a fortnight or three weeks, and at the same time cured of his piles. If one waits until all sloughing and inflammation have subsided before doing the radical operation, the total time before the patient is well is nearer five or six weeks. Slight complications, such as swelling and the formation of external piles, are certainly more common after the operation upon sloughing piles than when piles are operated upon in the ordinary way when there is no sloughing or strangulation; but since these complications are quite common to sloughing piles when no operation has been performed, little significance need be attached to them.

I have never seen any ill-effects follow immediate operation upon sloughing piles, and, on the other hand, I am sure that the patient is saved much trouble and pain by immediate operation.

The Ligature Operation.—The patient should be suitably prepared for operation in the manner described in Chapter III, p. 41. The anæsthetic is a matter of some importance. Chloroform is not very safe, as deep breathing, which is often caused by interference with the rectum, may result in over-dosage. Until recently ether was the favourite anæsthetic, but in the last few years has been almost entirely displaced, at any rate at St. Mark's Hospital and in my own private practice, by local or spinal anæsthesia. I have found a most satisfactory anæsthetic is low spinal anæsthesia. The anæsthetic area does not as a rule extend much beyond the perineum, and this will give ample anæsthesia for the performance of the operation. It is generally advisable that the patient should have some other form of anæsthetic, such as gas and oxygen, avertin, or evipan, but this is not really necessary. The operation can quite well be performed under pure local anæsthesia.

The patient should be placed in the lithotomy position, with the buttocks well over the end of the table. The left Sims position can be used, but is, in my opinion, not so satisfactory as the lithotomy position,

for it does not allow of such complete exposure of the parts, and if the patient moves at all as the result of the operation, which may easily be the case when one is dealing with such a sensitive part as the anus, it will be impossible to proceed with the operation until the patient has been moved back into position. This entails moving towels, etc., and interferes with the aseptic conditions of the operation; also the side position is not very suitable when a douche is being used, as the water is liable to run between the patient's legs and make a mess.

After the patient is in position the rectum, for as far up as can be reached, is thoroughly washed out with small flat swabs wrung out of monsol (ʒi.ss. ad O.i.) or some other suitable antiseptic solution, and dipped in ether soap. With these swabs the rectal mucosa should be cleaned just as carefully as one would cleanse the skin previous to operation. After this preliminary washing the rectum is thoroughly douched out with monsol (ʒii. ad O.i.), and, last of all, after the piles have been drawn down with forceps they are again cleansed with 75 per cent. spirit lotion or picric solution, and only after this are the towels applied.

The anus should be separated; but it is quite unnecessary and undesirable to stretch the muscle, provided that the latter is not hypertrophied and that the anæsthetic is properly given. In almost all descriptions of this operation dilatation of the sphincters is insisted upon as a necessary preliminary; and when I first began to operate for piles I also thought it an important part of the operation. But for some years I have quite given up the practice, and now never stretch it unless it is absolutely necessary to get at the piles, or unless there is obvious hypertrophy of the sphincter which requires correction.

Each pile is seized at its extremity with artery forceps, and all the forceps are left hanging out of the anus attached to their respective piles. There are usually three main piles, and sometimes two extra small ones. When the whole of one side of the rectum seems to consist of one large pile, or when one of the piles is very large, it should be treated as if it were two piles—that is to say, two pairs of forceps should be applied to it, and it should be split up between them.

The surgeon, having satisfied himself that all the piles have been caught in forceps, takes the clip attached to the lowermost pile in his left hand, and places the first finger of the same hand on the inner or upper surface of the pile (Fig. 44). Then, with a pair of straight, blunt-pointed scissors, he cuts into the junction of the pile with the skin just at its base (Fig. 45). This cut should open up the submucous space, and the pile should then be stripped up till it remains attached only by its upper end, which contains the vessels feeding it. The more usual method is to cut the pile away from the bowel wall till only the upper part is left; but though it is a little more difficult to acquire the knack of finding the right layer,

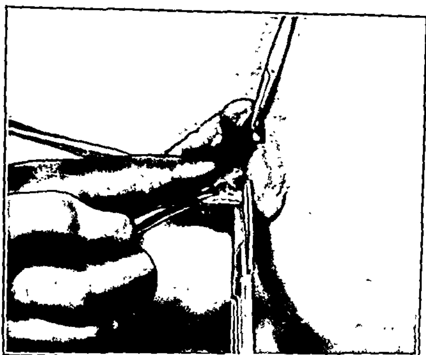


FIG. 44.—PHOTOGRAPH OF METHOD OF USING SCISSORS GUIDED BY LEFT FORE-FINGER TO SEPARATE THE PILE FROM THE ANAL WALL.

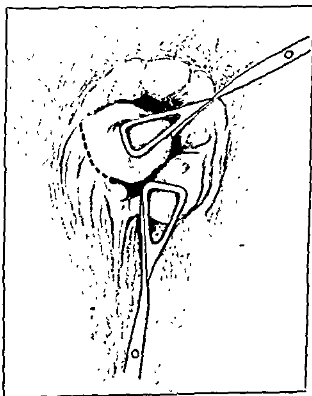


FIG. 45.—FIRST STAGE IN OPERATION FOR PILES BY LIGATURE.
The dotted line shows position of incision.

which is necessary if the pile is to be stripped up. I think it has considerable advantages, one being that there is less bleeding.

The clip is now handed to the assistant, and the surgeon takes a ligature, which should be about 8 inches long and consisting of No. 2 catgut of good quality. The centre of the ligature is placed in the groove formed by the separation of the pile from the rectal wall, and the assistant then drags the pile outward across the ligature, which is tied as tightly as possible round the neck of the pile with a knot on the bowel aspect (Fig. 46). The pile is then turned inwards and the ligature brought round and tied again on the outer side. Any redundant skin opposite

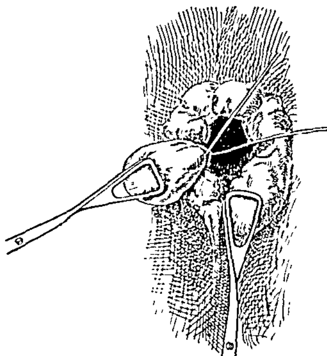


FIG. 46.—DRAWING TO SHOW THE SAME PILE AS IN FIG. 45, WITH LIGATURE IN PLACE AND READY TO TIE

the pile, or any external tag, is now cut away with scissors, and one end of the ligature is threaded upon a curved needle. The needle is passed through the skin at one extremity of the wound and the end of the ligature drawn through; the other end of the ligature is now threaded and brought through the other extremity of the wound in the same manner. The two ends of the ligature are now tied, so as to drag the skin up to the base of the pile (see Figs. 47 and 48). This considerably reduces the area of the wound that has to heal and diminishes the total period of healing. It is needless to point out that where the ligature is tied on the skin with a mattress stitch it must not be tied at all tightly, but just enough to

approximate the edges. Each pile is dealt with in turn, the lower ones being taken first, so that bleeding will not interfere with a good view of the parts while the others are being done. The piles should not all be ligated at the same level, but at different levels. Very considerable variation occurs in the size and number of piles present. The usual number is three, less commonly five. A large pile will require more separation than a small one, and so on. Unnecessary and extensive stripping up of the pile is to be avoided, the surgeon's object being to

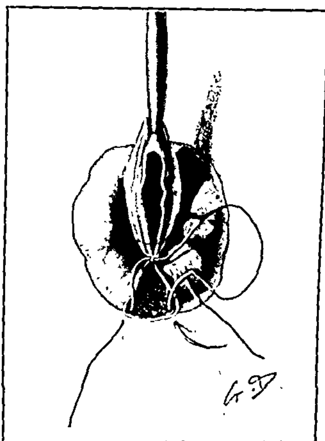


FIG 47.—AUTHOR'S METHOD, SHOWING THE ENDS OF THE LIGATURE BEING PASSED ON A NEEDLE THROUGH THE SKIN SO AS TO FORM A MATTRESS STITCH.

adequately remove the piles with as small a wound area as possible. If the pile is stripped up this must be done gently with the blunt ends of the scissors. The surgeon's object throughout should be to cause the minimum of trauma, if he wishes to avoid after-pain. Only the smallest number of ligatures should be used that are absolutely necessary, and the stumps of the piles should, as far as possible, not be so left that they will come in that part of the anal canal which is compressed by the external sphincter muscle. After-pain is very liable to result if the knot of a

ligature or the stump of a pile is so placed that it will be gripped by the sphincter. Any foreign body within the grip of the muscle is certain to cause discomfort and often quite severe pain. Careful attention to this little point I have found to be of great assistance in preventing after-pain from this operation. When one or more of the piles is big and its separation will leave a large raw area, steps should be taken to reduce this area to as small limits as possible.

When all the piles have been ligatured they should be cut off, but care must be taken not to endanger the ligature slipping. The surgeon should

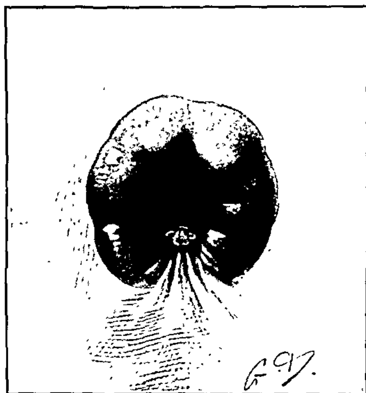


FIG 48 —AUTHOR'S METHOD, SHOWING MATTRESS STITCH TIED UP, AND STUMP OF PILE AND SKIN IN CONTACT.

Only one pile is shown removed. The remainder would be treated in the same way.

next insert his finger into the rectum, and if there is any narrowing caused by the tying of the piles, he should stretch this till it no longer exists.

The stumps of the piles having been returned into the rectum, the surgeon next proceeds to remove any external piles or skin tags which still exist outside the anus. These should simply be cut away with sharp scissors. There need be no fear of causing stricture by cutting away the skin in reason; stricture is nearly always due to sepsis and subsequent

contraction of fibrous tissue. Judgment is required in cutting away the skin outside, as one wants the parts to be as flat as possible and free from unsightly protuberances after healing is completed. Any vessels which squirt after the first moment or so are carefully picked up in fine artery forceps.

If there is much redundancy of the skin at the anal margin it should be dissected away and the venous plexus beneath it dissected out so as to leave the parts neat and trim.

Any bleeding-points that have been picked up with forceps will next require attention. If small, they should be twisted or tied off. I usually rely on twisting, so as to avoid unnecessary ligatures.

The parts having been cleaned up, about a drachm of sterilized vaseline is squeezed into the rectum from a collapsible tube, and a short piece of drainage-tube is inserted into the anus. The dressings are then applied and held in place by a T-bandage. The operation in experienced hands should not take more than five or six minutes to perform.

After-Treatment.—The dressings should be changed twice a day, and the external parts washed with weak carbolic lotion. I always remove the tube in twenty-four hours. Its chief object is to prevent oozing, and to give warning if there is concealed hæmorrhage; it is therefore unnecessary to retain it longer, and it is apt to cause discomfort after twenty-four hours. In many cases the use of a tube is unnecessary and undesirable.

I do not keep the patient on a slop diet, but allow ordinary food in small quantities until the bowels are open. The patient is allowed to move about in bed as he likes, but is warned against disturbing the bandage. If he complains of pain, 10 grains of aspirin are given by the mouth. Morphia is required only in quite exceptional cases, but it should certainly be given if there is severe pain, and in sufficient dose to be sure of allaying the pain.

The bowels are confined for two or three days. If the patient complains of distension, an aperient is given on the second day, otherwise on the third. To relieve the bowels, my own practice is to give a drachm dose of cascara and some liquid petroleum by the mouth on the evening before it is proposed to get the bowels open, and to give an enema of thin gruel (℥xvi.) and 6 ounces of olive oil the next morning. This enema is given with a funnel and tube, and with a No. 10 soft Jacques catheter, which must be well lubricated and *very gently* inserted into the rectum. This should result in an easy action without pain or serious discomfort. After this the bowels are kept acting daily with some mild aperient such as cascara or salts. The patient is allowed to use a night commode beside his bed when the bowels act, as there is less straining than when using a bed-pan. I also allow him to sit in a hot bath after the bowels

have acted. The bath should be in the same room or in an adjoining room. This gives immediate relief from the discomfort of the first stool. The patient is confined to bed until the ligatures come away, which usually occurs about the eighth to the eleventh day. After this he is allowed to get up, but is kept on the sofa for a few days longer until the wounds are quite healed, which is ascertained by passing a finger into the bowel.

The Clamp and Cautery Operation.—This operation was most frequently associated with the name of the late Mr. Henry Smith, although, in truth, it was devised in its entirety by Mr. Cusack of Dublin, and was first introduced into London by Mr. Henry Lee of St. George's Hospital.

The position and preliminary stages of the operation are the same as for the ligature method. After the sphincters have been dilated, one of the piles which it is desired to remove is seized at its extremity by a clip and drawn down. *If there is any skin at the lower portion of the pile,* a cut should be made with scissors so as to prevent the skin being caught in the clamp (Fig. 49). The clamp is now slipped over the forceps and

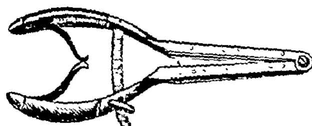


FIG. 49.—HÆMORRHOIDAL CLAMP

the pile grasped at its base. The clamp should next be screwed up as tight as possible to prevent all danger of its slipping (Fig. 50). Next, the pile should be cut off with scissors on the distal side of the clamp; about ¼ inch of the pile should, however, be left projecting from the clamp. The pile should never be cut off flush with the clamp. A piece of damp gauze should next be tucked in round the blades of the clamp, so as to protect the mucous membrane while the cautery is being used. The stump of the pile that has been left projecting between the blades of the clamp should now be thoroughly cauterized with the blade of a Paquelin or electric cautery heated to a dull red heat (Fig. 51). If the cautery is used very hot, bleeding is likely to occur when the clamp is released. Some surgeons prefer to use a large cautery iron instead of the Paquelin blade. The projecting portion of the pile should be thoroughly charred. The clamp can then be relaxed, and if any bleeding occurs, it should be retightened and the cautery again applied.

Each pile must be treated in the same way. After all the piles have been so treated the stumps should be gently smeared over with sterilized

contraction of fibrous tissue. Judgment is required in cutting away the skin outside, as one wants the parts to be as flat as possible and free from unsightly protuberances after healing is completed. Any vessels which squirt after the first moment or so are carefully picked up in fine artery forceps.

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After-Treatment.—The dressings should be changed twice a day, and the external parts washed with weak carbolic lotion. I always remove the tube in twenty-four hours. Its chief object is to prevent oozing, and to give warning if there is concealed hæmorrhage; it is therefore unnecessary to retain it longer, and it is apt to cause discomfort after twenty-four hours. In many cases the use of a tube is unnecessary and undesirable.

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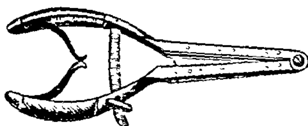


Fig 49.—Hæmorrhoidal Clamp

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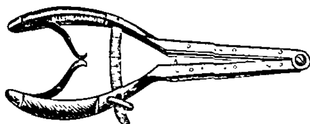


FIG. 49.—HÆMORRHOIDAL CLAMP

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Each pile must be treated in the same way. After all the piles have been so treated the stumps should be gently smeared over with sterilized

vaseline, and a firm pad of wool applied over the anus. The after-treatment is the same as for the ligature operation. This method of treating

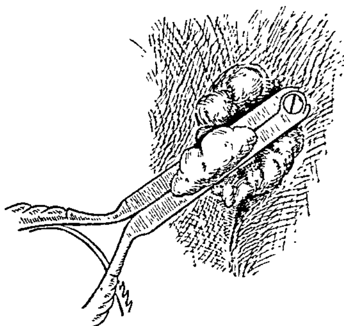


FIG. 50.—CLAMP AND CAUTERY OPERATION.
The pile to be removed is shown crushed in the clamp and ready to be cut off.

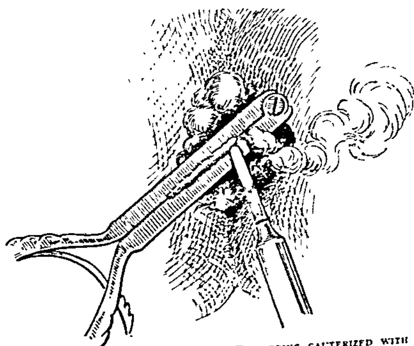


FIG. 51.—THE CRUSHED STUMP OF THE PILE BEING CAUTERIZED WITH A PAQUELIN'S CAUTERY.

internal piles is used considerably in America and Germany, but is not often employed in this country except in special cases.

In performing the clamp and cautery operation there are one or two important details. The clamp should be as tight as possible, and the hinge of the clamp must be applied so that the base of the pile containing the vessels is nearest the hinge. A good piece of tissue should be thoroughly burnt until it is well charred right down to the blade of the clamp. The clamp must not be removed too soon; at least two to three minutes should elapse after cauterizing before removing a clamp, and when doing so it should be very gently relaxed and then slid off, so as not to open up the wound.

The removal of the piles is not so complete as with the ligature method, and recurrence is more likely to follow. Secondary hæmorrhage is certainly more common than after the ligature operation. The wounds resulting from a burn do not heal so rapidly as those resulting from a clean cut, as in the ligature method, and healing tends to be delayed in some cases. As regards the subsequent pain, there is not much difference between this and the ligature method, though I should certainly favour the latter in this respect. The operation takes longer to perform than the ligature, and is a decidedly messy one, owing to the smoke and smell.

Though this operation is safe and satisfactory in the hands of those accustomed to it, complications are more frequent and more severe than after the ligature operation.

Excision of Internal Hæmorrhoids.—Many different methods have been proposed by surgeons for treating piles by excision and suturing of the wound or wounds. This method is certainly the ideal one, but it is always a mistake to give up an operation which has proved entirely satisfactory and adopt another, the only claim of which is that it more nearly conforms to what the surgeon considers the operation should be. An operation should always be judged by its results, and not by its technical details only. At any rate, it is a mistake unless the new operation can be proved to be as entirely successful and free from danger as the old one.

So far no method of excision has been, as regards its results, so satisfactory as the ligature method, and many surgeons who have practised one or other of the excision methods have after a time gone back to the ligature operation.

There are several different excision methods which vary only in a few details. In some a special clamp is used, while in others the suturing is done without any special apparatus.

The Author's Excision Operation.—The sphincter is sufficiently stretched to bring the pile well into view, and a clip is then applied to the lowermost part of the base of the pile. Another clip is applied to the pile itself, and the separation of the pile from the rectal wall is commenced, starting from just above the lower clip. A small incision is first made

with blunt-nosed scissors, and the wound on the rectal wall sewn up by a continuous catgut suture on a curved round-bodied needle. This suture is continued along the incision as the latter is made by successive snips of the scissors, the suture being kept tight by an assistant while the surgeon is separating each portion of the pile. In this way the wound formed by the removal of the pile is sewn up simultaneously with the

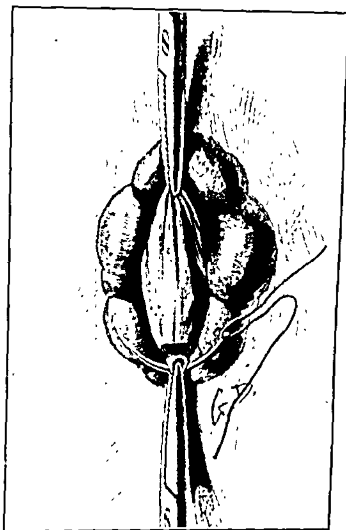


FIG. 52.—DIAGRAM TO SHOW THE AUTHOR'S OPERATION FOR INTERNAL PILES.
Shows separation of the piles commenced and first stitch being inserted.

separation of the pile from its base (Fig. 52). When the pile has been completely separated, with the exception of its upper extremity, which contains the largest vessels, the end of the suture is tied over the remains of the pile, and the narrow pedicle grasped in the termination of the suture in the same way as it would be by a ligature. The pile is then cut off just beyond this ligature, a sufficient stump being left to insure a good hold for the suture.

Each pile is treated similarly, but it is never advisable to remove more than three piles at the same time by this method. If the stitching is carefully done, this method gives very good results; but I have now almost entirely discarded it in favour of the ligature operation, as I

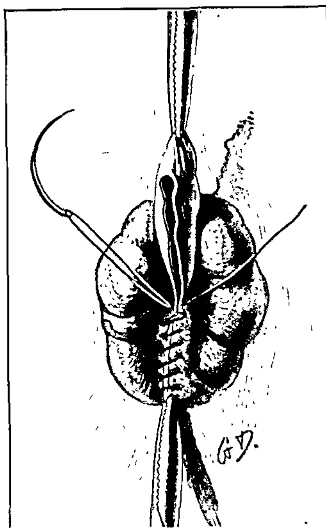


FIG. 53.—DIAGRAM TO SHOW THE AUTHOR'S OPERATION FOR INTERNAL PILES. Shows separation almost completed, and last stitch ready to be tied.

found that recurrence was more apt to take place than after the ligature operation, and very little is gained.

Whitehead's Operation.—I have always been an uncompromising opponent of this operation as the right treatment for ordinary cases of internal piles; and I have never been able to see any reason for preferring it to the other and simpler methods. Whitehead's original

contention, that recurrence was impossible after this operation, has long ago been proved to be fallacious. Recurrence is certainly commoner than after any of the other operations; while complications are much commoner and far more serious than after the ligature or clamp and cautery methods. I have personally never used it for an uncomplicated case of piles, but have done so on a good many occasions where the piles were complicated by a considerable prolapse of the mucous membrane.

With modifications, it is a useful operation in some cases of stricture very near the anal orifice. If it is recognized that the operation should

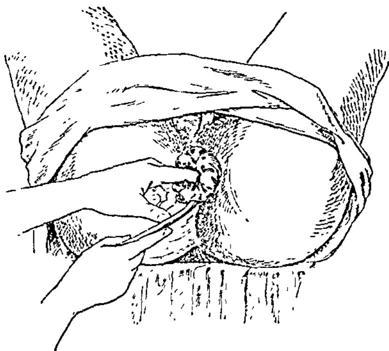


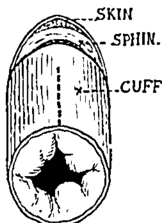
FIG. 54.—DRAWING TO SHOW METHOD OF SEPARATING THE CUFF OF MUCOUS MEMBRANE BY BLUNT DISSECTION

be reserved for a few special cases, I think it has a useful place in rectal surgery.

The following is the method of performing this operation:

The patient is prepared in the usual way, and the sphincters are stretched. The bowel is thoroughly washed out, as has already been described (see p. 89). An incision is then made with scissors at the junction of the skin with the mucous membrane on one side of the bowel, or posteriorly. The end of a pair of blunt-pointed scissors is next inserted into this incision until the points are felt by a finger in the rectum to lie in the submucous space, and by blunt dissection the mucous membrane is separated from the external sphincter in both directions (Fig. 54). The whole of the mucous membrane lining the anal canal, together with the hæmorrhoidal mass, is freely separated in this way by blunt dissection.

Then, with one blade of the scissors within and the other on the outside, the junction of the mucous membrane with the skin is cut through, first on the one side and then on the other. The only point at which there is any



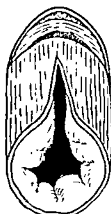
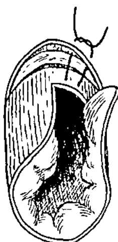


FIG 55 FIG. 56.

FIGS 55 and 56—DIAGRAMS TO ILLUSTRATE WHITEHEAD'S OPERATION FOR PILES The cuff drawn down, and the direction of the incision along the anterior wall indicated by the dotted line, the cuff split up to the level of transverse division

difficulty in the separation is in front, or at any spot where there has been an inflamed pile. When the cuff of the mucous membrane has been completely separated the whole way round to a sufficient extent to allow



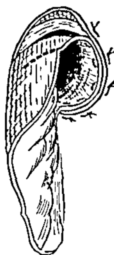


FIG. 57. FIG. 58.

FIGS 57 and 58—DIAGRAMS ILLUSTRATING WHITEHEAD'S OPERATION. Transverse incision commenced, and first suture in place; cuff cut away on right side, and stump of mucous membrane sutured to skin.

healthy mucous membrane to be drawn down to the skin, two or more T-clips are attached to the cuff just below the level at which it is proposed to divide it tr

so as to split the cuff on the anterior aspect up to the point of transverse division. The cuff is cut off in stages, a small portion being cut and sutured to the skin, and then the next portion cut and sutured in a similar manner, until the entire cuff has been separated and the mucous membrane stitched down to the skin. A separate suture should be used for each half circumference of the bowel, and the two ends tied together at the back. Any points which fail to stop bleeding should be controlled by the insertion of mattress sutures.

The suture material should be catgut. The suture may be either a continuous through-and-through one or an interrupted mattress suture. Personally I prefer the latter as being less liable to give way, but it takes a little longer to insert. The subsequent dressing is exactly the same as for the ligature operation previously described.

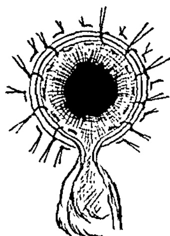


FIG 59 — DIAGRAM ILLUSTRATING WHITEHEAD'S OPERATION: FINAL STAGE BEFORE THE LAST PORTION OF THE CUFF IS CUT OFF.

In Whitehead's original operation a circular incision at the junction of the mucous membrane and skin was first made the whole way round, and the cuff was then dissected up from below. The method here described, which I believe owes its origin to the late Dr. Tuttle of New York, differs from the original operation in that the separation of the cuff is done before it has been cut away from the skin at its lower end. This, though a little more difficult to do, has the advantage that it involves much less bleeding, and that the separation is done with very much greater rapidity. It is, however, very important to find the correct layer.

It is necessary to observe the following points in performing this operation: (1) The cuff should be separated exactly at the junction of the skin and the mucous membrane. (2) The separation must be in the submucous layer. If carried the least bit outside this, the muscular wall of the rectum will be damaged. (3) Great care must be taken to prevent damage to the external sphincter in performing the operation. It is very easy for anyone unaccustomed to the operation to carry the dissection outside the external sphincter, in which case a large portion of this muscle may easily be removed, with disastrous results. (4) Too large a cuff must not be removed, or there will be serious tension on the sutures, and retraction will almost certainly occur. (5) The suture should be carried deep, so as to get a good grip of the cuff, and so as to control the bleeding. (6) The suturing must be very accurately done, and care taken not to leave places where the mucous membrane extends too far down to the

skin, or where the skin extends too far up to the mucous membrane, as either of these conditions will give rise to very considerable trouble later on.

There has in the past been much discussion on the merits and demerits of Whitehead's operation, but the results have proved that it is not a good operation, and although there are still a few surgeons who perform it, the general opinion of surgeons is entirely opposed to it.

Pain after Operation.—For many years—in fact, since its inception—the operation for internal hæmorrhoids has enjoyed an unenviable reputation for being followed by severe pain. There is undoubtedly no question that in the past this reputation was well earned, and it is true that quite severe post-operative pain has been, and still is, the rule after this operation, except in the practice of a few surgeons who have made a special study of the means of preventing it. The skin at the anal orifice is one of the most sensitive areas in the whole body, sharing this distinction with the mouth, the lips, the fingers, and the big toe. There are two senses: one is tactile, produced by contact of the contents of the bowel with the mucous membrane of the anal canal; and the other is the muscle sense, which may be described as the sensation caused by the stretching action of the muscle due to something within its grip. The sensitive area is practically confined to the anal canal proper; from 1 to 1½ inches above the anal orifice the mucous membrane is hardly at all sensitive, except to distension of the rectal lumen.

The operation for piles of necessity implies interference with this sensitive area. Now, almost all the sensations at the anal orifice have for their immediate object some alteration in the state and degree of contraction of the sphincter muscle, and the action of this muscle is almost entirely reflex in character. It is therefore easy to understand why operations in this area are liable to result in pain, since the wounds cause constant irritation of this reflex, with consequent spasm and painful contraction of the muscle. Realizing this, and influenced by the teaching of Hilton, surgeons attempted to prevent post-operative pain by stretching this muscle and so causing temporary paralysis. This was not successful, however, because in the first place, unless the muscle is actually damaged, paralysis is too transient—not lasting more than thirty minutes in most cases, and often not as long—and also because the muscle in the process of recovering its powers of contraction contracts spasmodically, causing sudden violent pain each time one of these contractions occurs.

The relief of pain by opium and morphia, while preferable to allowing the patient to suffer, is not satisfactory. To be of any real use it must be administered at frequent intervals for several days. Even then it will have the effect of making the patient feel ill and uncomfortable, and often of rendering him quite miserable. How, then, can we best prevent pain after this operation? The answer is that pain can be prevented

by applying the same principles that have enabled surgeons to avoid pain resulting from operation wounds in other parts of the body. We have found that if a wound is made with no bruising or tearing of the tissues, under aseptic conditions, through clean tissues, and is kept aseptic and at rest, pain, except of a very slight and transient character, does not result. The anal region is no exception to this rule, and, given the same conditions, after-pain will be equally absent from operations in this region. Many surgeons, however, have assumed that an operation for piles cannot be carried out under aseptic conditions owing to its involving the rectum, and have therefore been content to perform this operation under conditions which they know are not aseptic, in that the tissues are not aseptically clean, or that contamination of the wound during or immediately after the operation is almost certain to take place.

For the last twenty years I have been operating for piles on these lines, using the ligature operation in all but a few special cases, and I have found that post-operative pain is not more severe or frequent than after operations for hernia or varicose veins. Morphia is seldom required except as a hypnotic or to prevent the bowels from acting, and in the great majority of cases there is no pain of any consequence after the operation. Of course, it occasionally happens that the aseptic technique breaks down and infection of the wound occurs, with the result that post-operative pain requiring the use of morphia follows; but with increasing experience I have found that these cases have become less and less frequent, and most of the failures have been due to the fact that the preparation of the patient to insure the bowels being empty has not been sufficiently carefully carried out. Pain after this operation, instead of being the rule, has become quite the exception.

Pain when the bowels act for the first time is avoidable with care and good nursing. With a skilled nurse, pain after an action of the bowels is the exception. There is nothing to be gained by keeping the bowels confined for more than three or four days, as by that time the wounds in the anal canal have commenced to granulate and infection will not result. After this a mild aperient daily is all that is necessary. I never allow the interior of the bowel to be interfered with in any way until all the ligatures have separated, except by the administration of a small injection of oil into the bowel daily to assist smooth action and protect the surface of the wounds.

I think it is better not to interfere with the patient's diet in any way, and instead of putting the patient on a slop diet after operation I allow an ordinary diet, but the amount of this is somewhat diminished until the bowels have been opened. I find patients are far less likely to get indigestion or discomfort and the bowels are more easily relieved when the diet is not altered. Suddenly to put a healthy man on a diet of milk

is quite sufficient to give him indigestion without the added factor of an operation and confinement to bed.

The Formation of External Tags.—A very common complication after any operation for piles is the formation of small tender skin swellings round the anal margin, generally known as inflamed tags. No matter how the operation is performed, it does not appear to be possible to entirely avoid their recurrence. They occur in about 6 per cent. of all cases. A great deal may be done to avoid them with careful aseptic technique, and in removing any inflamed skin or thrombosed vessels at the time of the operation. They most commonly appear after the first action of the bowels, and are largely due to the fact that removal of internal piles to some extent interferes with the return of the blood from the venous plexus which surrounds the anus just beneath the skin margin. They are really external thrombosed piles resulting from the operation. They are never of any serious consequence, but they may be somewhat painful, and they are certainly unsightly. Moreover, patients on discovering them think that the piles have not all been removed, as they can still feel some swelling. Unless they are large they do not require any further treatment, as they will disappear in a week or ten days, leaving a perfectly flat surface. When, however, they are very big, they should be removed. This should be left until about the eighth or ninth day after operation, when some 2 per cent. novocaine should be injected with a fine needle under the base of each tag which is desired to be removed, and the inflamed skin should then be cut away with a pair of scissors. This should be done with proper antiseptic precautions, and the small wounds which result will generally heal in the course of forty-eight hours.

Retention of Urine.—This occurs in a certain proportion of cases, no matter how carefully the operation is performed. It is not, however, peculiar to operations for piles, as it often occurs after operations for fistula, hernia, varicose veins, varicocele, and numerous other operations. The liability to retention depends very much upon the manner in which the operation is performed. It is most likely to occur in those cases where the parts have been roughly handled, where the sphincter has been thoroughly stretched, where the rectum is packed, and when there is much swelling of the anus as the result of operation. It used to be stated that retention was particularly liable to occur when an anterior pile was ligatured. I have not found this to be the case. In fact, since I have adopted the method of operating which I now use, I have found retention of urine to be a very uncommon complication. I do not think I have during the last two years found it necessary to pass a catheter in more than 1 in 100 cases.

Hæmorrhage.—This is, fortunately, a rare occurrence with the present improved methods of operating; but it still occasionally follows operations

for piles, etc. It is a very troublesome complication, not only on account of the difficulty of stopping it, but also because a large amount of blood may be lost into the bowel before there is any external evidence of its presence. The hæmorrhage usually takes place about the eighth or ninth day after operation. The bleeding is free, and is accompanied by a considerable amount of collapse. It is well to remember that the amount of blood lost externally is no indication of the total hæmorrhage, as the rectum and sigmoid may be filled with clot. The best way to stop the bleeding is to plug the rectum. This is best done as follows: A piece of sterilized india-rubber drainage-tube about 3½ inches long and ½ inch in diameter is taken, and round one-half of this a strip of dry gauze or wool is wrapped, so as to increase its diameter by about three times. The surface of the gauze is then well greased with sterilized vaseline, and the tube is inserted into the rectum with the big end upwards through a tubular speculum. The portion of the tube which projects out of the anus should then be pulled upon, so as to bring the dilated part down against the bleeding surface. A large safety-pin should next be passed through the end of the tube about ½ inch away from the anus, and a long strip of gauze which has been previously greased with vaseline wrapped round and round the tube between the anus and the safety-pin. Any required amount of pressure can thus be exerted upon the bleeding-point, as the gauze wrapped round outside pulls down the tube and retains it in place (Fig. 60). This method of plugging can be carried out without an anæsthetic if a speculum like that shown in Fig. 15 can be passed into the rectum. The plug and tube can be inserted through the speculum and the latter withdrawn, leaving the plug and tube in place.

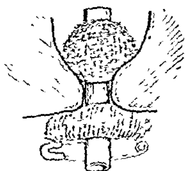


Fig. 60

It is seldom necessary to leave the plug in for more than forty-eight hours. After its removal, a small piece of drainage-tube may be left in the bowel to give warning should any further bleeding occur.

In women, hæmorrhage from the rectum may be temporarily controlled by passing the finger into the vagina and compressing the rectal wall against the sacrum. My colleague Gabriel carried out an investigation into the subject of post-operative hæmorrhage. He found that severe secondary hæmorrhage requiring active interference occurred in 1 per cent. of cases (5 cases in 470), and that the average date was seven days after operation and following an action of the bowels.

The hæmorrhage was usually concealed, and considerable bleeding had

occurred before it was revealed by a copious action of the bowel consisting of blood.

He found plugging by the method already described the most effectual method of controlling the bleeding.

Metastatic Infection.—This is very rare, and should not occur if the operation is performed aseptically. I have met with two cases of this unpleasant complication. In neither case did I perform the original operation, and so cannot tell exactly what was done, but the patient developed serious septic complications in distant parts of the body some weeks after the operation, although the healing of the rectal wounds was apparently in both cases quite normal.

Case.—A. C., an elderly man, was operated on in St. Mark's Hospital for piles by ligature. There were no complications, and the wounds healed in the usual time and in the usual manner. The ligatures came away on the tenth day, and the patient was to have left the hospital on the twelfth day, but he developed a cough. His breathing became embarrassed, and at the end of the third week he developed a double empyema. The pus removed from the chest was tested, and was found to contain a pure culture of *Bacillus coli*. The patient subsequently died.

Case.—A. R., a man aged fifty-six, was operated on for piles at a London hospital. The wounds appear to have healed up quite satisfactorily, and he left the hospital in the usual time. A month after the operation he went back to report himself, and apparently a dilator was passed, which caused him a little pain at the time. The same night he woke up with severe pain in the right wrist-joint, which by the morning was badly swollen and very painful. I saw him a month later, and he then had a typical septic joint, with absorption of all the cartilages of the wrist and carpal joints. In fact, the joint was attacked by acute rheumatoid arthritis.

While it cannot be absolutely proved that the operation was responsible in either of these cases, it seems more than probable that it was.

As in all other operations which involve a wound, infection with virulent pathogenic micro-organisms may occur and cause serious trouble. Thus, cases of tetanus and severe suppuration, with sloughing and perirectal abscess, have occurred. But all these serious septic complications are entirely preventable, and should not arise if proper precautions are taken. These complications are now extremely rare, but in the days before antiseptic surgery was discovered they were common enough to cause grave apprehension.

Stricture.—This complication may follow any operation for piles. It used to be thought that it resulted from the cutting away of too much tissue, but while this is certainly a possible cause, it is certainly a very unusual one.

The common cause is sepsis following the operation, especially when there is ulceration of the anal canal. It should never occur if the operation is properly performed, and in my experience never does so when the operation is performed by a skilled operator. The following is a good example of stricture following the operation by ligature:

Case.—The patient was a gentleman aged sixty-two, who was operated on by a general practitioner for large prolapsing internal piles. I was asked to see him two and a half months after the operation, as he was having considerable pain when the bowels acted, and constant actions without much relief. On examination I found a tight stricture just above the anal orifice which would only admit the tip of the finger, and was obviously due to the contraction of dense fibrous tissue, probably the result of too free removal of the piles or to severe sepsis following the operation. A second operation was performed, and a cuff of mucous membrane, including the stricture, was removed from the lower part of the rectum, and the cut edge was stitched down to the skin. The patient did well after this, and has had no further trouble.

It may also occur as the result of ulceration of the rectum due to infection of the wound after an operation which has been quite properly performed. This condition of infective ulceration of the rectum used to be quite common at St. Mark's Hospital in the pre-antiseptic days, infection appearing to spread from case to case, doubtless as the result of infection being carried by instruments, nurses, etc. Since the introduction of antiseptic surgery and the careful use of antiseptics in the performance of rectal operations, this form of spreading infective ulceration has become very rare, and is now seldom met with. It often resulted in considerable destruction of tissue, followed by very severe contraction. It is, however, an entirely preventable complication.

Whenever a wound is made in the rectum there is always a liability for contraction to occur during the process of healing, and as during this time the stools will be soft as the result of taking aperients, there will be nothing to counteract this tendency. It is always necessary for the surgeon to bear this in mind and to watch for any such tendency in order that he may deal with it at the earliest stage. As soon as the ligatures have separated a finger should be passed into the rectum, and if there is any sign of contraction the parts should be gently stretched. The patient should always be examined on two or three occasions to insure that no contraction has occurred, as it can very readily be put right in the early stages. There is occasionally a low-grade infection which is liable to cause narrowing if neglected. No case of stricture should ever occur after a pile operation if the surgeon is careful to examine the rectum during the later stages of healing.

Recurrence after Operations for Piles.—At St. Mark's we see very many patients who have been operated on for piles very many years before.

The ultimate results of operation are extremely good, and while one cannot say that recurrence of the piles *never* occurs, the percentage of such recurrences is less than one-tenth of 1 per cent., or less than 1 per 1,000. Also in those cases where there is recurrence I generally find that there is some definite reason, such as disease of the liver causing chronic portal congestion, chronic alcoholism, which doubtless operates in the same way, or chronic morphinism, which probably acts by causing very severe constipation. I know of one patient who for over twenty years has regularly taken from 6 to 10 grains of morphine daily. During that time he has been operated on three times for internal piles.

These remarks only apply to cases where the ligature operation has been performed by a surgeon who is thoroughly competent. In looking through my case books I find that fully three-quarters of all cases of recurrence after pile operations are cases where the operation has been performed by a surgeon with comparatively limited experience in the performance of the operation.

Incontinence.—Incontinence should never occur after an operation for piles, and, except in the case of Whitehead's operation, practically never does so. Of course, after any operation on the rectum which is so carelessly performed that a portion of the external sphincter is cut away, incontinence may result. Apart from this, however, it is impossible after the ligature operation. It is occasionally seen after Whitehead's operation. It may then occur because the sphincter muscle has become involved in the fibrous tissue resulting from the operation, and the muscle has been rendered inefficient in consequence.

Stone, in a careful investigation of the after-histories of 185 cases operated upon by Whitehead's method, found that there was some impairment of control over the stools in no less than 37 cases, and there was recurrence of the symptoms in 14 cases.

Abscess and Fistula.—Abscess and fistula may rarely occur after an operation for piles, as they may after any injury to, or operation on, the rectum. When they do, it is generally in consequence of careless operating, and the muscular coat of the bowel having been injured. But with the performance of operations upon the rectum under proper antiseptic conditions any such complication becomes extremely improbable.

Fissure.—Fissure sometimes results after an operation for piles, and where pain following defæcation is found to persist for a considerable time after such an operation I should always be suspicious of this cause, and make a very careful examination. It is not at all a common complication after a properly performed operation, and if the patient is carefully watched during the healing stage, the condition can easily be corrected by the use of dilators or local applications to any portion which is not healing properly.

CHAPTER VI

PROLAPSE

Prolapse of the rectum is the term used to describe any condition in which part of the bowel is protruded or everted through the anal orifice. There are a great many varieties and degrees of the condition, varying from the eversion of a small portion of mucous membrane just within the sphincters to the complete eversion of the entire rectum.

An attempt has sometimes been made to distinguish between "prolapse" and "procidentia." The two words, however, mean the same. "Prolapsus ani" is often distinguished from "prolapsus recti," but the conditions are essentially the same, and the difference is only one of degree. Very slight degrees of prolapse are quite common temporary conditions, and may accompany any state associated with tenesmus or violent straining.

Real prolapse of the rectum is generally met with in two varieties—prolapse of the rectum in children from the age of about six months up to eight or nine years, and in adults over the age of twenty. It is also quite a common condition in old age. In adults, prolapse is not often met with except in the slight degree which is commonly associated with internal piles. It is commoner in women than in men. This is accounted for partly by child-birth and consequent damage to the pelvic floor. It is also partly due to the fact that in men the muscles attached to the pelvic bones are, as a rule, better developed, and thus the rectum is better supported. Another very important factor is that in women the peritoneal cavity descends lower, and consequently the intra-abdominal pressure is exerted more directly upon the orifice of the bowel.

Adult prolapse is not infrequently seen in weak-minded persons and lunatics, and may accompany certain diseases of the central nervous system. It is often seen in asylums, and Hall estimated that a prolapse was present in one out of every 300 lunatics. I have seen prolapse on many occasions in weak-minded individuals, and in association with paraplegia and disseminated sclerosis. In the latter the cause is no doubt straining to empty the bladder and weakness of the rectal muscles and sphincter.

Slight prolapse is common in inflammatory conditions of the rectum—such, for example, as acute proctitis—owing to the fact that there is œdema in the submucous cellular tissue which separates the two bowel

coats, and so enables the mucous membrane to be protruded by the action of the muscles in defæcation. For the same reason, prolapse of the rectum often occurs after wasting illnesses, owing to the fact that the fatty tissue lying around the rectum is absorbed.

Violent straining from any cause—cholera, dysentery, summer diarrhœa, etc.—especially when accompanied by tenesmus, may result in prolapse. Another cause is the presence of some tumour, polypus, neoplasm, or a bunch of piles, which drags upon a portion of the bowel wall. The tumour tends to be extruded when the bowels act, and so drags down the mucous membrane behind it.

Rectal prolapse is a comparatively common affection among children, especially in that class which attends hospitals. Among the better classes, prolapse of the rectum certainly occurs in children, but is not so common, the reason being that the children are better looked after, better nourished, and more quickly attended to if ill. Among children, the condition is about equally common in the two sexes. Thus, out of fifty cases collected from my own records, I find twenty-two were males and twenty-eight females. The average age was two and a half years, the youngest child being three months old. The commonest antecedent cause was diarrhœa. Other common causes were nasal obstruction due to adenoids and whooping-cough. In quite a number of cases the condition follows upon some illness, such as measles, scarlet fever, summer diarrhœa, etc., and an important factor in such cases is the loss of fat. A local condition in the rectum is not such a common cause of prolapse in children as is generally supposed.

The following table shows the ascertained cause in fifty cases:

Diarrhœa	14
Adenoids	13
Constipation	1
Worms	3
Polypi	2
Whooping-cough	3
Measles	3
Inflamed prostate	1
Stricture	1
Non-ascertainable causes	9
	50

In a normal infant the rectum is well supported by the surrounding fatty cellular tissue, which forms a firm support over the lower portion of the bowel. As age advances this fat to a large extent disappears, and the cellular tissue takes on the form seen in the adult. In the child, however, the cellular tissue supporting the rectum consists mainly of fat. The first effect of malnutrition in an infant is absorption of fat, and the removal of fat surrounding the rectum predisposes to prolapse of the bowel wall from very slight causes. The exciting cause of prolapse

however, is the unnatural method of defæcation usually adopted in civilized countries. Prolapse of the rectum is practically unknown in animals and among the uncivilized races of mankind. The natural position for defæcation is the squatting position, with the abdominal wall in contact with the front of the thighs. There are two important anatomical factors which aid in preventing prolapse in this position: the glutei and perineal muscles are firmly contracted, and all the muscles and fascia of the pelvic floor are in a condition of tonic contraction, which tends to support the rectum. The coccyx, too, is firmly flexed, and a sharp angle given to the terminal portion of the alimentary canal. As the result of this, the force tending to extrude the rectum is exerted against the front of the coccyx rather than directly upon the anal orifice.



FIG. 61.—PATULOUS ANAL OPENING THE RESULT OF CHRONIC PROLAPSE.

In the case of prolapse in adults the causes are not so easily ascertained. The condition is a comparatively rare one, and although there is generally an antecedent history of illness, accompanied by diarrhœa, this is not always the case, and I have not been able to find that there is a history of prolapse in infancy in any definite proportion of the cases.

The factors tending to produce prolapse in adults naturally fall into several groups. Conditions associated with severe straining and tenesmus may produce prolapse, just as they may produce hernia. Thus, stricture of the urethra, chronic cough, proctitis, and the bad habit of sitting at stool for long periods, all tend to produce prolapse. Tumours of the bowel, such as polypi, are often causes of prolapse. Traumatism, too, may cause prolapse. Thus, we find it sometimes after operations which have left a patulous condition of the sphincter ani, and after severe laceration of the perineum in child-birth. It may also result from mere loss of muscular tone in the parts, or from paralysis of the sacral nerve trunks. Once a prolapse has been established, it tends to increase in

size each time it comes down, and to drag more and more bowel into its walls. The sphincter, from constant stretching, soon loses its tone and becomes patulous. As the support of the sphincter is lost in this way, the prolapse tends to come down more and more easily, so that after a time it comes down on the slightest effort, such as sneezing or blowing the nose, or even from assuming the erect position.

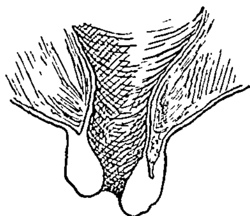


FIG. 62.—PROLAPSE OF MUCOUS MEMBRANE ONLY.

Pathology.—The prolapse may involve only that portion of the mucous membrane lining the anal canal, in which case it is frequently referred to as "prolapsus ani." This condition is usually, if not invariably, a complication of internal piles, and, apart from the piles which cause the condition, is of comparatively little importance (Fig. 62).

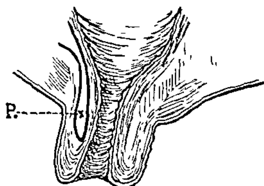


FIG 63.—COMPLETE PROLAPSE OF FIRST DEGREE.
P, Peritoneum present in anterior layers of prolapse.

After this one may find almost any degree of prolapse. A distinction must, however, be made between what are sometimes called the first and second degrees of prolapse. In the former and common form of prolapse the mucous membrane covering the outside of the prolapse is directly continuous with the anal margin of the skin (Fig. 63); in the second degree

of prolapse there is a definite sulcus between the prolapse and the anal margin (Fig. 64).

A prolapse which protrudes for more than about 2½ inches may contain a portion of the peritoneal cavity between its coats. The peritoneum is first dragged down in the front portion of the prolapse, and as the prolapse becomes larger, more of the peritoneal cavity becomes involved, so that in a large prolapse the inner layer may be completely surrounded by peritoneum. Owing to the fact that the peritoneum extends much lower on the anterior wall of the rectum in the female than in the male, the peritoneal cavity is involved with a lesser degree of prolapse in women than in men.

Intestine may, of course, come down into the peritoneal cul-de-sac contained in the prolapse. After a prolapse has existed for some time,

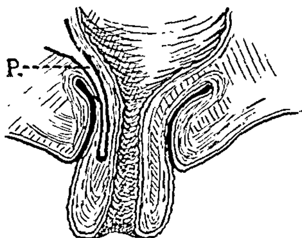


Fig. 64.—Complete Prolapse or Second Degree.
Note there is a sulcus between the skin at the anal margin and the wall of the prolapse. P, Peritoneum present in the anterior walls of prolapse.

secondary changes may occur. Thus, the mucous membrane may become very much thickened from constant irritation, and œdematous ulceration may follow. Very marked changes in the mucous membrane are usually present in a prolapse of long standing, especially if the patient has not been able to keep the prolapse up. Much thickening of all the coats of the bowel takes place in time. The sphincters from the constant stretching eventually give way, and the anus becomes quite patulous, so that there is a large gaping opening and the prolapse comes down as soon as the patient stands up (Fig. 65).

The colour of the prolapse is at first that of the normal mucous membrane of the bowel, but later it becomes a vivid scarlet colour or purple, from congestion and interference with its blood-supply.

Complications.—*There* are several complications which may occur in severe cases of prolapse. Thus, a loop of intestine may come down into

the peritoneal cul-de-sac, which has been dragged down by the prolapse, and become strangulated there in the same way as it would in a strangulated hernia. Rupture of the walls of the prolapse with the protrusion of intestine is a rare and dangerous condition which has been known to result from forcibly attempting to reduce an inflamed and œdematous prolapse. This has also been known to occur during attempts at defæcation. Severe ulceration of the protruding portion, with possible perforations of the peritoneal cavity, is another rare complication.

Prolapse of the rectum is often associated in women with prolapse of the uterus. I have seen several cases in which there was prolapse of all

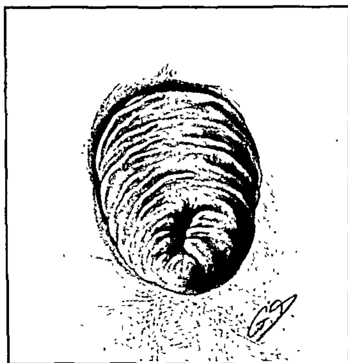


Fig. 65.—Complete Prolapse of the Rectum.

the pelvic organs. Such cases are generally due to a damaged perineum from child-birth. The difficulty of dealing with such cases is very considerable.

Symptoms.—At first the prolapse only comes down while at stool, and is easily replaced, or, more often, returns of itself in the course of a few minutes, or after the patient has lain down. After a time, however, the prolapse will not go back unless replaced, and this may sometimes be quite a difficult thing to do. In course of time, as the sphincters give way, the prolapse comes down so readily that the patient is unable to hold his breath without forcing down the prolapse. Thus, it will come

down on the least attempt to blow the nose, sneeze, or cough, and some patients are unable to walk about without promptly bringing it down. A certain amount of bleeding often occurs, but is never serious. Pain of a bearing-down character usually accompanies the condition; difficulty with micturition and other symptoms, due to dragging upon the pelvic organs, are generally present in severe cases.

The most distressing symptom to the patient is the loss of control over the stools which results from a bad prolapse. The patient is often quite incontinent, and the fæces pass from him without his being able to do anything to prevent it.

The condition is one which causes the most profound misery to the unfortunate patient, and although it is not dangerous, it is exceedingly incapacitating.

Reduction of the Prolapse.—Usually the patient can easily reduce the prolapse either by drawing in his breath or with his fingers, but sometimes the prolapse becomes strangulated and the patient is unable to reduce it himself. It often happens that when a doctor is called upon to reduce a rectal prolapse it has been down for some hours and the mucous membrane has already been to some extent damaged by the patient's own efforts to replace it. As a rule the reduction of the prolapse is not a difficult matter. The patient should be placed in such a position that the drag of the intestines tends to reduce the prolapse. The knee-elbow position, where this is possible, is the best; failing this, the left Sims or semi-prone position should be adopted. The apex of the prolapse should first be pressed inwards, and then succeeding parts of the bowel, until the base is reached. The method which I have found to be most satisfactory is the following: A small piece of dry cotton-wool is placed upon the apex of the prolapse, and then pressed up with one finger. Before this finger is removed another piece of cotton-wool is placed on the next portion to be returned, and with the other finger this is pressed up, while the first finger is withdrawn. This process is repeated until the entire prolapse has been replaced, the pieces of cotton-wool being left. Another similar method is one in which cigarette-papers are used instead of cotton-wool.

The reduction should be carried out slowly and gently, and on no account should any force be used. If the prolapse is found to be swollen and œdematous, and great difficulty is experienced in reducing it, the patient should be placed on the side, or, better still, on the face, with the buttocks well raised, and cold-water compresses applied to the prolapse for an hour or longer, after which an attempt should again be made to reduce it. The chief factor which renders reduction difficult is adhesion between the entering and returning layers due to inflammation; gentle massage of the prolapsed mass between the fingers will sometimes

help to loosen the coats from each other. If it is still found impossible to reduce the prolapse, a general anæsthetic should be administered and the sphincter carefully stretched until the prolapse can be replaced quite easily. The anæsthetic should not be made an excuse for the exertion of force in reducing the prolapse, but merely given for the purpose of stretching the sphincter. It must always be borne in mind that there may be intestine, and there certainly is peritoneum, in the anterior portion of the prolapse. If the prolapse has a curve bending backwards towards the sacrum, and especially if, with one finger in the prolapse and the other outside, a thickened mass can be felt in the front portion of the prolapse, it is probable that intestine is present in the wall. The prolapse can always be replaced, though there may be considerable difficulty in doing it. If, however, the prolapse is already gangrenous when first seen, very careful consideration will be required, and it is not safe to return the prolapse in such a condition, as it may easily cause fatal peritonitis. The best treatment in such cases is immediate amputation of the entire prolapse, but it must be borne in mind that the peritoneal cavity is going to be opened, and proper drainage must be provided.

Third Degree Prolapse.—This condition is one in which the colon prolapses into the rectum, but no protrusion occurs at the anus. It is really a condition of intussusception of the colon into the rectum. It often causes considerable difficulty in diagnosis, and may be overlooked. We can easily understand this, as there is nothing to be seen outside and the condition is usually intermittent; an examination of the rectum will only reveal the condition if the prolapse is down at the time.

The condition causes a great deal of distress: there is a bearing-down feeling in the rectum which comes on after standing or walking, and is especially experienced at stool. The pain may be very severe, and there may be collapse and fainting, especially when trying to relieve the bowels. There is often considerable blood and mucus in the stools; a distressing pain in the lower abdomen is also sometimes complained of. These symptoms may only come on at intervals of months or weeks. In mild degrees of the condition the symptoms may be very obscure and the diagnosis easily missed. If the condition is suspected, the patient must be examined during an attack or nothing will be found. The prolapse can be felt with the finger, and with the sigmoidoscope it can be easily seen. The symptoms are similar to those of a growth in the rectum, but an examination will easily exclude this. The treatment consists in fixing the lower pelvic colon by colopexy. Monsarrat has written a very good description of the condition, and his paper should be referred to for further information.

Treatment.—In discussing the treatment of prolapse of the rectum it is necessary to distinguish three types of cases: first, cases of prolapse

of the rectum accompanied by piles; secondly, prolapse of the rectum in children; and thirdly, prolapse of the rectum in adults. With regard to the first—prolapse of the rectum accompanied by piles—the treatment for this condition is that for the piles which have given rise to it, and will be found fully described in the chapter on that subject.

Treatment of Prolapse of the Rectum in Children.—As has already been said, by far the commonest causes of prolapse in infants and young children are carelessness and malnutrition. If these are corrected—that is to say, if the child is given proper food, healthy and hygienic surroundings, and tonics, such as syrupi ferri phosphatis comp., combined, if necessary, with a little strychnine, cod-liver oil, etc.; and if, in addition, great care is taken to prevent the prolapse coming down—most cases of prolapse of the rectum in children will rapidly get well without any operative treatment.

The mother or nurse must be given instructions on no account to allow the child to sit on any receptacle for the purposes of defæcation. At first the child should pass all its stools lying in bed on the side, the bowels being opened by means of an enema; and later, for some months the stools should be passed in the squatting position into a shallow pan placed on the ground upon which the child cannot sit. In the case of very young children a large piece of inch-wide strapping should be fixed across the buttocks just behind the anal orifice, so as to support the buttocks during defæcation.

Careful attention to these points and to the general well-being of the child will, in the vast majority of cases, lead to a complete cure of the condition in quite a short time.

If there is any definite cause for straining, such as whooping-cough, adenoids, etc., this must be attended to before proceeding to the treatment of the prolapse. Of course, if there is a polypus in the rectum, this will require removal, but my experience has been that this is very rarely the cause of prolapse in children.

In a few cases, either because the prolapse has existed for a long time, or because the treatment recommended is not properly carried out, or for some other reason, the prolapse continues to come down. Under these circumstances operation will be necessary. Simple linear cauterization, which will be described presently, is all that is required in such cases of prolapse in children, and in only a few cases have I known this to fail. As an alternative, my operation will be found to give complete satisfaction in these cases.

A method of treatment which has recently been much used for the treatment of prolapse in children is by injection of the submucous layer of the bowel with a solution which will cause adhesions. The solutions that have been used are 5 per cent. carbolic acid in oil and absolute or

80 per cent. alcohol. The carbolic acid injection is similar to that used in the treatment of piles. The fluid is injected just under the mucous membrane high up, and sufficient is used to inflame a considerable section of the bowel wall. Care must be taken in children not to inject the carbolic solution into the circulation. The alcohol solution is used in the same way, but is more liable to cause sloughing, and only a small amount (some 20 minims) can be injected in one place. The results are excellent, and one or two treatments are generally enough to cure the patient.

Treatment of Prolapse in Adults.—This is a very much more difficult matter than treatment in the two types of cases already mentioned. The difficulty of curing a case of prolapse of the rectum, when the prolapse is of any size, has become proverbial, and one has only to look at the numerous operations that have been described to see what a difficult matter it is. I know of no method of treating prolapse in adults, short of operation, that has the slightest prospect of success, nor have I ever seen a case really cured apart from operation. Unless the patient is willing to submit to an operation, the best that can be expected is that the condition may be to some extent alleviated by the wearing of an apparatus for preventing the descent of the prolapse. This will, however, result in considerable discomfort, and probably in incontinence. The type of apparatus that I have found to be the simplest and most effectual for keeping up the prolapse consists of an india-rubber tube about ½ inch in diameter, which is attached to a waist-belt behind, and comes forward between the legs, where it is fixed by a strap and buckle to the front part of the waist-band. The rubber tube should lie over the anus, and will generally give sufficient support to prevent the prolapse from coming down.

In elderly patients who do not get about much it is inadvisable to operate, and the best treatment in their case is non-operative. The apparatus just described should be worn to keep up the prolapse, and the bowels should be carefully regulated so as to prevent straining, and to produce that type of stool which is the least irritating. The bowels should always be opened while the patient is lying down, and astringent injections into the bowel should be used. Very often the best plan is to teach the patient to give himself a daily enema or to arrange that this be done for him.

Among other so-called non-operative methods of treating prolapse in old people, one of the most useful is by injection with 5 per cent. carbolic acid in oil. The solution should be injected just under the mucous membrane about 3 inches up the bowel; 5 to 10 c.c. may be injected at one sitting. The method is most effectual, but has to be repeated, as the results are not very lasting. Solutions of quinine have been used for the same purpose, but the carbolic solution is safer, as there is no danger

of sepsis owing to the antiseptic properties of carbolic acid. Some very remarkable results have been obtained by this method in cases which otherwise could not have been treated. The method of treating prolapse by injection is exactly the same as the treatment of piles by injection (see p. 80), except that the injections are made higher up the bowel and the amount of solution used is greater.

Operative Treatment.—The two following methods of operating on a prolapse are only suitable for cases of infantile prolapse, or possibly in very slight cases of adult prolapse. They are quite useless for the ordinary prolapse of adults, and should not be attempted in such cases. In children, when operation is necessary, they are generally quite effectual if proper after-care is also instituted.

Linear Cauterization.—The patient is prepared for operation in the usual way. A large wire rectal speculum is then passed into the bowel (Fig. 66), or in place of this any fenestrated speculum can be used. Alternatively the prolapse can be drawn down with forceps and cauterized

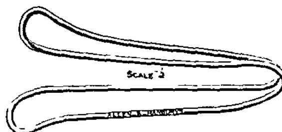


FIG. 66.—WIRE SPECULUM.

outside, and afterwards returned. This is the method I prefer myself. The mucous membrane is dried with mops as far as possible. Then, with a Paquelin's cautery with a broad point heated to a dull red, longitudinal lines are burnt on the mucous membrane down to the anal margin. Three or four of these longitudinal lines are made in the bowel wall, the number depending upon the size and length of the prolapse. The depth of the burning should be sufficient to cause adhesions between the mucous and muscular coats of the bowel in the process of healing; but care must be taken not to make the burning too deep, or serious abscess and even inflammation of the peritoneal cavity may result.

The bowel should be dressed with a small plug of gauze thoroughly soaked in sterilized vaseline, and the patient should be kept recumbent for three weeks at least, the bowels being opened by means of enemata. This operation often gives very satisfactory results in cases of slight or very early prolapse, and is also all that is usually necessary when operation is required for prolapse in children. In severe cases of prolapse in adults it is, however, practically certain to fail, and is not worth trying.

The Ligature Method.—In this operation, which is only suitable for quite slight cases of prolapse, portions of the mucous membrane of the bowel are caught up in forceps; a shallow groove is nicked with a pair of scissors round the base of each portion of mucous membrane held by the forceps, and the mucous membrane is then ligatured with a stout silk ligature in a similar manner to that used in the operation for piles. The amount of mucous membrane caught up and the number of places in which it is ligatured must, of course, depend upon the size and nature of the prolapse. This operation acts in a similar manner to the cautery—namely, by the production of adhesions between the two coats of the bowel, and also by causing a certain amount of narrowing to the lumen. It is only of use in cases to which the cautery method is also applicable—that is to say, in cases of prolapse of the first degree before hypertrophy or thickening has occurred, and when the condition is only of very recent origin. It is unlikely to succeed in cases of a large prolapse which has existed for some time.

The operations for prolapse of the rectum in adults may be roughly divided into two classes: those which aim at suspending the bowel from above, including all the different forms of colopexy, and those which aim at restoring the natural supports of the rectum either by refixing it or by plastic operation upon the muscles, or both—that is to say, at restoring the bowel to its original condition by the aid of adhesions or stitches. These operations are usually called " proctopexy."

With the exception of cases of prolapse of the third degree, which are really cases of intussusception of the colon into the rectum, and not of prolapse, the latter type of operation is the most satisfactory, and is likely to be followed by the best results. It has the additional advantage that it does not necessitate opening the peritoneal cavity, and there is therefore less risk attached to the operation.

The principle of a prolapse of the rectum is similar to that of a prolapse of the uterus, and the same principles are necessary in order to remedy the condition. As is the case with the uterus, it is not sufficient merely to fix the organ in place, but also to repair the pelvic floor. In the case of prolapse of the rectum this means repairing the anus, so that the sphincter muscle can close the opening. An operation for prolapse of the rectum which leaves the patient with a patulous anus cannot hope to be successful. In old-standing cases the anus is generally patulous and the muscles badly stretched, while in some cases it may be almost impossible to elicit any contraction of the external sphincter on stimulation. If there is any appreciable weakness of the sphincter, it is absolutely necessary to put this right at the same time as the prolapse is dealt with, or at least before the patient is allowed to get up and get about, otherwise a good result is not to be expected. It is this fact which often

renders it very difficult to cure prolapse in the aged, as the muscular tone in the sphincter is gone and cannot be restored. In such cases all that the surgeon can hope to do is to narrow the anal orifice.

The object of all forms of proctopexy is to anchor the rectum by adhesions to the sacrum and surrounding pelvic fascia. Many different operations have been devised for the purpose of obtaining this, some by means of stitches passed around the sacrum, as in Tuttle's operation, others by the excision of portions of the bowel, or by the use of clamps, etc. The operation, however, which I have found by far the most satisfactory in all cases of prolapse of the first and second degree is one which I first performed twenty-four years ago, and which was described in the *Lancet*, March 5, 1910. It has the advantage of being both simple and effectual, and of restoring the bowel to its normal condition previous to the presence of the prolapse. The following is a description of the operation:

The Author's Operation.—The patient is very carefully prepared for operation in the manner already described on pp. 41 and 42. This is of great importance, for it is essential to insure that no action of the bowels shall take place for at least four or five days after operation; in fact, until steps are taken to that end.

The length and degree of the prolapse must first be ascertained by seeing the bowel in the prolapsed condition. If at the time of operation the prolapse is down, it should be carefully returned. The patient should be placed in the lithotomy position, with a small sand-bag under the sacrum. The lower part of the rectum is then thoroughly washed out with spirit soap and water by the aid of flat swabs. It is then douched out with lysol or monsol, 1 drachm to the pint, and any excess of the solution removed by dry swabs. The external skin around the anus and over the coccyx should now be thoroughly cleaned up by means of acetone, and again painted with iodine solution.

A transverse incision about 2 inches long is then made at a point about half-way between the tip of the coccyx and the posterior margin of the anus (Fig. 67). This incision is deepened, keeping slightly backwards towards the coccyx, and in it the attachment of the external sphincter to the coccyx should be completely divided. The incision is carried down, a knife or blunt-pointed scissors being used, towards the tip of the coccyx until the posterior rectal space is opened up. Great care must be taken on no account to open the rectum in making this incision. A gloved finger is then inserted into the posterior rectal space through the incision, and this space is thoroughly opened up to each side of the rectum and up along the hollow of the sacrum. As a rule the space strips very easily, as the cellular tissue is very loose as the result of the prolapse. The amount to which the posterior rectal space should be separated must

depend upon the extent of the prolapse. Roughly, the extent upwards to which separation should be carried out is about equal to the length of the prolapse when down. The separation should be done entirely by blunt dissection with the finger or with blunt-pointed scissors, so as not to cause hæmorrhage, and the greatest care must be taken to preserve complete asepsis during this stage of the operation. The separation should be carried round the sides of the rectum as well as up along the posterior wall, so that the subsequent adhesions shall hold as much as possible of the rectum, and not merely one small part of it.

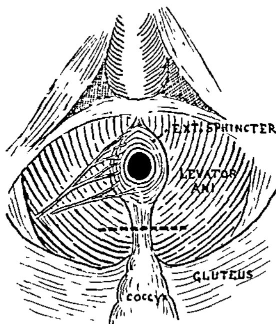


Fig. 67.—Anatomical Diagram of Anal Region
The dotted line shows the incision.

The separation having been effected, the surgeon having changed his gloves, and the wound being protected from any possible leakage from the rectum, the whole area behind and to the sides of the rectum is packed with gauze. The best gauze for the purpose is 2-inch ribbon gauze with a selvage, which should be prepared in the following manner: A wide-mouthed bottle is packed tight with gauze and is then sterilized, while hot melted vaseline is poured into the bottle until full. The bottle is then heated up in the sterilizer and more vaseline added until as much as possible has been taken up by the gauze. The cap is then screwed on and the bottle sterilized in the autoclave. There should be at least 5 or 6 yards of gauze available, and it is carefully packed into the hollow of the sacrum, round the sides of the rectum, and above the levatores

ani muscles, the object being to leave sufficient amount of gauze to prevent primary union between the rectum and the walls of the pelvis. The gauze should be packed in flat sheets as far as possible, so as to prevent undue pressure upon the rectal wall, and a considerable amount of gauze should thus be introduced. If, as is usually the case, more than one length of gauze has to be used, the ends should subsequently be tied firmly together, so as to prevent any possibility of any of the gauze being accidentally left behind. Lastly, the skin wound should be temporarily closed with a stitch.

Unless the external sphincter is undamaged and is competent to completely close the anus, some plastic operation must be performed in order

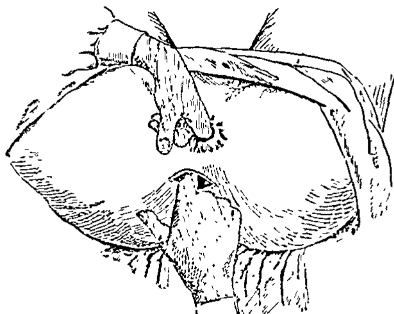


FIG. 68.—DRAWING TO SHOW THE METHOD OF OPENING UP THE POSTERIOR AND LATERAL RECTAL SPACES WITH ONE FINGER IN THE RECTUM AND ONE IN THE WOUND (AUTHOR'S OPERATION).

to restore it. This may either be done at the same time, or may be postponed to a subsequent period, but in any case before the patient is allowed to get out of bed.

The exact type of operation necessarily will depend upon the case, and the reader is referred to the chapter on incontinence.

A short tube is placed in the rectum to prevent prolapse should the patient strain while coming round from the anæsthetic, and the whole perineum is covered with sterilized dressings.

The wound is dressed twice daily and fresh dressings applied, but the packing is not removed for a week. At the end of this time an anæsthetic is given, the wound reopened, and all the packing removed, and the cavity is carefully repacked with vaseline gauze. No attempt to close

the wound is made on this occasion, but the ends of the packing are left protruding from the wound; this packing is also left in for five days or a week, when it is again removed, but this time no fresh gauze is introduced, but a drainage-tube is placed in the cavity left by its removal. Asepsis is very important at the operation, but by the time the packing is removed at the end of a week the walls of the cavity have granulated, and there is no danger of sepsis. The wound should not be allowed to heal under three weeks; in fact, the more slowly it heals the better the result. The bowels are left confined until the seventh day after operation, when they are relieved by an enema before the removal of the packing; after this they are opened daily with an enema, a slipper bed-pan being used. If the prolapse is a bad one the patient is not allowed out of bed for four weeks.

After the wound has healed, if a finger is passed into the bowel, it will be found that the whole posterior rectal wall is densely adherent to the hollow of the sacrum, and it is practically impossible for the posterior and lateral walls of the bowel to come down. Further, the division of the posterior attachments of the external sphincter to the tip of the coccyx allows the anus to move forward a slight amount, and while in no way damaging the power of the muscle, puts a slightly greater bend on the end of the rectum, and this in itself tends to prevent further prolapse.

To perform this operation successfully it is necessary to free the rectum both posteriorly and laterally very freely, and to go well up to the sacral prominence, and the whole of this area must be packed with vaseline gauze. Also it is useless to expect success if a patulous sphincter is left; this must be corrected before the patient is allowed up. In the majority of cases it is surprising how quickly an apparently hopelessly patulous anus recovers after the prolapse is dealt with, but in severe cases a plastic operation is required.

This operation, while it fixes the posterior and lateral walls of the rectum, does not fix the anterior wall, and in cases where the prolapse is very large I now fix the anterior wall at the same time by a modification of McCann's operation of stitching together the anterior portions of the levator muscles.

The results of the operation have proved very satisfactory, and as I performed the first operation for prolapse by this method over twenty years ago, sufficient time has elapsed to prove its value. The fact that it has now been very generally adopted is, I think, also proof that the results are satisfactory. I have treated fifty patients for prolapse by this operation. The average age of the patients is forty-three (thirty-one women and nineteen men). The operation appears to be quite free from risk, as there were no serious complications in the entire series. In six cases the prolapse recurred, but two of these cases were mentally deficient.

The remainder have remained well. Many of these fifty cases were very bad, and had had numerous operations performed upon them previously without success.

Operation for Fixing the Anterior Wall of the Rectum.—This operation is performed in the lithotomy position. A T-shaped incision, similar to that used for a ruptured perineum, is made (see Fig. 69). The anal sphincter and the lower end of the rectum are exposed by dissection and the rectum freed from the posterior vaginal wall for about 2 inches. This should expose the anterior attachment of the levatores ani muscles. Catgut sutures are now introduced from one side to the other, so as to draw the sphincter muscle firmly together with the adjacent tissues and to narrow the opening. The anterior attachment of the levator muscles is now similarly sewn together with catgut sutures. These sutures should also pick up the outer coat of the rectum and fascia over it, but must not go through the mucous membrane. Lastly, several large silkworm gut traction sutures are inserted, passing out through the skin,

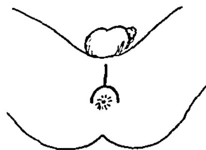


FIG. 69.—INCISION IN OPERATION FOR FIXING THE PROLAPSING RECTUM ANTERIORLY.

so as to take any strain off the catgut sutures that have already been inserted. Finally, the external incision in the skin is carefully sutured, rubber tubing being used to separate the silkworm gut stitches to prevent them cutting into the skin. The method of inserting the sutures is shown in Fig. 70.

This operation is very effectual in fixing the anterior rectal wall and in restoring the normal calibre of the anal opening. Although originally described as only applying to women, it can equally well be performed in men.

Amputation of the Prolapse.—This operation has been advocated by several well-known surgeons, but it has the serious objection that it is by no means free from risk, owing to the fact that the peritoneal cavity has to be opened, and that infection is liable to occur both during and after the operation, and may lead to septic peritonitis. Recurrence, too, very frequently takes place after this operation. In my opinion, it should therefore be reserved for those cases in which the prolapse is irreducible, and these, if proper care is taken, will be very few. In cases of this kind,

however, there will frequently be a considerable amount of sepsis, and even of gangrene of the prolapse. This is a serious complication in an operation which involves the opening of the peritoneal cavity. The prolapse should be cleaned up very thoroughly with strong antiseptic lotion as far as is possible before the operation is commenced, and great care must be taken to avoid handling the septic parts during the operation.

The operation is performed by making a circular incision at the base of the prolapse—that is to say, where the mucous membrane joins the

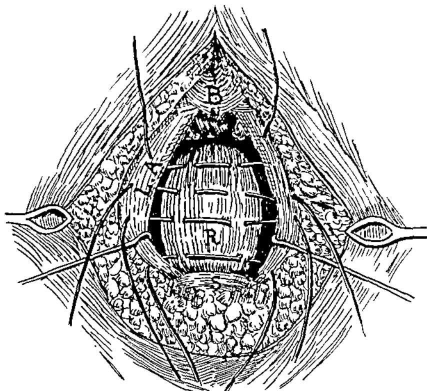


Fig 70.—Operation for fixing the Prolapsing Rectum Anteriorly (after Maes and Rivers)

R, Rectum; S, sphincter; L A., levator ani muscle; B, bulb of urethra.

skin. This incision should cut through mucous membrane alone at first, and a cuff should be turned down. The wound having then been rendered as clean as possible, should be deepened anteriorly until the peritoneal cavity is open. The serous cuff covering the intussuscepted portion of the bowel should then be dissected up, and the two serous layers sewn together so as to close the peritoneum as effectually as possible. The wound is then gradually deepened, first towards one side and then towards the other, each section of the peritoneal cavity being closed immediately after it has been opened. When this has been done, and the incisions

extend beyond the limits of the peritoneum, the remainder of the bowel can be cut completely through, and the edges of the mucous membrane seized with forceps. The wound having been again thoroughly washed with strong antiseptic lotion, the mucous membrane lining the bowel is carefully and accurately sutured to the divided edge of skin. A series of single sutures should first be put in at regular intervals all the way round the bowel, and care should be taken to see that these have a good grip of the tissues. *Mattress sutures are the best.* Lastly, using these as retractors, a continuous suture of catgut should be put in so as to obtain accurate apposition of the two edges of mucous membrane. If the surgeon has any doubt as to the asepticity of the deeper tissues of the wound, a small drain should be provided in the anterior portion, which leads down to the shut-off peritoneum. A large tube should be passed up into the bowel, the parts should be carefully dressed, and the bowels should be kept confined for five or six days. It must be remembered that intestine may be met with in the front portion of the prolapse on opening the peritoneal cavity. To prevent this, the operation is best performed with the patient in the half Trendelenburg position.

Sigmoidopexy.—The object of this operation is to fix the lower end of the pelvic colon and the upper part of the rectum, so as to prevent their being able to prolapse into the lower part of the rectum. The operation should not be performed for an ordinary prolapse of the rectum of the first degree, but is the proper treatment for prolapse of the second and third degree where the pelvic colon intussuscepts into the rectum.

This operation is not a very satisfactory one, and the result is often disappointing. The adhesions fixing the bowel are very liable to stretch in course of time and to allow the condition to recur, and unless the operation is very carefully performed, so as to leave no gap on the outer side, a loop of small intestine is liable to become herniated. Several attempts have been made to improve the operation by taking tucks in the mesocolon so as to shorten it and to tighten up the peritoneal connections of the lower end of the colon, but it cannot be said that there is any method which is uniformly successful. However, when the operation is performed, it is most important that no hole or tunnel should be left through which a loop of small intestine can pass and get strangulated. I have twice had to operate upon patients for chronic obstruction of the small intestine, owing to a loop of small bowel becoming herniated behind the fixed colon.

The earlier operations consisted of fixing the pelvic colon to the abdominal wall, but this is a thoroughly bad procedure and *should not be done.* The adhesions stretch and twisting of small bowel round them is liable to take place.

The operation is performed as follows: The abdomen is opened by an

oblique incision, as shown on p. 561, for exposing the pelvic colon. The colon is then drawn up so as to undo the prolapse and render the parts taut. A suitable position for fixation of the pelvic colon is selected in the left iliac fossa over the iliacus muscle. A flap should be marked out on the parietal peritoneum. This flap with its base on the outer side should consist of peritoneum and deep fascia, and be about 3½ to 4 inches in length; it should extend well down into the true pelvis, but should not expose the main bloodvessels. The flap should be lifted for about 1½ inches, as shown in Fig. 71, and stitches of No. 1 catgut should then be inserted so as to fix from 3 to 4 inches of the pelvic colon to the raw

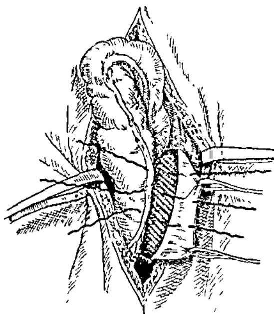


FIG 71 —DRAWING TO ILLUSTRATE THE OPERATION OF SIGMOIDOPEXY

surface exposed by lifting the flap. The stitches should get a good hold on the bowel by passing through the longitudinal muscle band, but great care must be taken to prevent puncturing the bowel or kinking the colon. These stitches are tied up and then the edge of the flap and the sides are carefully stitched to the colon, and the tunnel left beneath the fixed area is next obliterated by a purse-string suture in the mesocolon and parietal peritoneum. It is sometimes better to obliterate the space between the mesocolon and the parietal peritoneum before fixing the colon in the left iliac fossa. When all the stitching is completed the abdomen is closed. The patient should be kept in bed for a month to give the parts time to become firmly fixed.

CHAPTER VII

ABSCESS

Abscesses in the perianal region are not at all uncommon, and may occur in a great variety of forms and as the result of many different conditions. Except in relation to their situation, they differ in no important particular from abscesses in other situations. They are chiefly of importance because they very frequently result in the formation of a fistula, a subject which will be discussed further in Chapter XI. Like all other abscesses, they are due to the infection of the tissues by micro-organisms, which have obtained an entrance either through some wound or abrasion, or via the blood-stream or lymphatics. The micro-organisms causing infection are naturally of many different kinds, but the *Bacillus coli* is most frequently present, though this does not necessarily mean that it is the primary cause of the suppurative process. How often it is the primary infective organism and how often it is only a secondary infection it is very difficult to ascertain. It is occasionally found in practically pure culture in ischio-rectal abscesses, and it then seems justifiable to assume that it is the infecting organism. Such cases are, however, very uncommon, and it is much more usual to find it associated with staphylococci, or occasionally streptococci. In many cases it would seem probable that the *B. coli*, though present, has no pathogenic importance, for it is nearly always to be found as a complicating organism.

Gas-forming organisms are not uncommon, and may easily give rise to the impression that the abscess communicates with the bowel, when it does not really do so. It must never be assumed that the presence of gas in an ischio-rectal abscess is evidence of communication with the bowel.

The bacteriological examination of the pus from abscesses in this region is a matter of the very greatest difficulty. Organisms are seldom found in pure culture, a great variety are generally present, and it is very difficult to draw any conclusions with regard to the particular organism which is causing the infection. I have often seen patients being treated with *B. coli* vaccine because an examination of the pus from an abscess had revealed the presence of this organism. This is absurd, for *B. coli* is nearly always present both in the abscess and in the fæces, and there is no reason to suppose that it is the cause of the trouble.

It is often asserted that most abscesses in the neighbourhood of the rectum are tubercular in origin. I think, however, this is far from being the truth. The majority of abscesses are certainly due to the ordinary infective micro-organisms, and only a comparatively small percentage are due to the tubercle bacillus. A tubercular abscess may be the primary manifestation of tubercular infection in the patient, and then, no doubt, is due to direct accidental infection with tubercle bacilli. More frequently, however, a tubercular abscess in the neighbourhood of the rectum is a secondary infection from the alimentary canal, either from infected sputum swallowed by the patient or from a tubercular lesion in the alimentary tract itself.

Causes of Abscess Formation.—One of the commonest causes is some slight abrasion, either on the skin in the anal region or more frequently in the mucous membrane just within the anal canal. This, by allowing micro-organisms, which are nearly always present, to find an entrance to the tissues, is the starting-point for the formation of an abscess.

Injuries due to fish-bones or other hard substances present in the fæces, or to the careless use of enemata, are common causes.

Many abscesses in this region result from the neglect of a fissure at the posterior margin of the anus. Piles, when they become strangulated and gangrenous, may give rise to the formation of an abscess. Abscesses also occasionally occur as the result of operations performed in this neighbourhood, especially if proper care is not taken in regard to antisepsis.

It is usual to classify abscesses in this neighbourhood according to the tissue in which they arise. Thus there may be skin abscesses, such as boils or carbuncles; these differ in no way from similar lesions in other parts of the body, except that they are often extremely painful.

Ischio-Rectal Abscesses.

These are abscesses occurring in the loose cellular tissue enclosed in the ischio-rectal space. They are limited on the inside by the rectum itself and the lower surface of the levator ani, and on the outside by the obturator fascia covering the lower part of the obturator internus muscle. The levator ani muscle practically surrounds the rectum behind, so that there is a space at the back by which the two ischio-rectal fossæ can communicate with each other. The ischio-rectal fossæ are peculiar in that the deep fascia, instead of being situated just beneath the skin, as in most other parts of the body, in this situation lines the walls of the fossæ; consequently, an abscess in the connective tissue can spread readily in the two ischio-rectal fossæ before any bulging of the overlying skin occurs. When the abscess has formed, it spreads in the areolar tissue before causing obvious swelling outside. But it may spread from one side

to the other by means of this posterior passage. Above the levator ani there is another space containing areolar tissue, between this and the peritoneum, inside the pelvic fascia. Abscesses here are very serious, owing to their proximity to the peritoneum, as they may track up into the iliac fossæ before becoming obvious from outside. On passing the finger into an ischio-rectal abscess, one finds that it is not single, but loculated or honeycombed, the abscesses apparently communicating with one another. This is owing to the areolar tissue being burrowed through between the denser bands of the connective tissue.

These abscesses often attain a considerable size, and what appears to be a comparatively small abscess may be found at the operation to contain nearly a pint of pus, and will leave a huge hole which will take many weeks to heal.

Ischio-rectal abscesses always start on one side of the bowel, but owing to the fact that the pus very readily finds its way round posteriorly to the opposite side, the abscess is frequently found to be on both sides when first detected. It is remarkable how small an amount of external evidence of abscess there may be in these cases, although both ischio-rectal fossæ may be full of pus.

The symptoms of ischio-rectal abscess are the same as those of a deep abscess in any other situation. There is generally a sense of pain or discomfort, specially marked on sitting; and the premonitory symptom is often a chill, not infrequently a definite rigor, and the temperature is raised. It is not unusual to find the general symptoms well marked before there is any local discomfort. Pain is not usually severe, but is often of a dull throbbing character. The patient should be examined in the knee-elbow position, when it will more easily be seen that there is a swelling on one side of the buttock. If the abscess has reached the skin, there will be a red blush over the whole of one side, and considerable induration of the skin itself. When these abscesses point, they generally do so at the inner edge of the buttock, close to the anus. Fluctuation can be obtained with one finger in the rectum and one on the buttock, but it is often difficult to elicit, and is not to be depended upon. The diagnosis of an abscess in this situation is best made from the general appearance.

Subcutaneous Abscess.

Subcutaneous abscesses occur just round the margin of the anus, and do not involve the ischio-rectal space, and it is this which distinguishes them from this variety. The abscess forms just within the anal canal and inside the external sphincter. Many of the tuberculous abscesses are of this subcutaneous type. This form is more painful than any other, the pain being mainly proportional to the degree to which the abscess is in the grip of the sphincters. It is surprising how much pain can be

track running up beneath the mucous membrane for some inches, with other branching tracks running transversely round the bowel.

Submucous abscesses must be opened from within the bowel. This is sometimes a difficult matter. The sphincter must be well stretched, and a duck-bill speculum placed in the bowel so as to expose the abscess. The abscess should be opened with a knife, and then part of the mucous membrane covering it cut away with scissors, so as to lay it freely open into the bowel, or a submucous fistula will be certain to form. Some difficulty may be experienced in stopping the bleeding, especially if the abscess extends high up the bowel. Irrigation with hot lotion and light packing with gauze around a rectal tube will generally enable one to control the bleeding. Subsequently the bowel should be washed out with some weak antiseptic two or three times a day, but it is better not to attempt to put any packing into the wound except what may be necessary to stop initial hæmorrhage.

Abscesses above the levator ani muscles often present very serious difficulties. As a general rule, it may be said that these should not be opened through the rectal wall unless there is no other possible means of getting at them. Abscesses opened from inside the rectum are exceedingly difficult to deal with, and great trouble may be experienced in getting them to heal. Any abscess which can be felt by a finger in the rectum can most certainly be reached by cutting down upon it from outside, the knife being guided by a finger in the rectum; when the abscess is reached it should be drained by means of large tubes. On no account should packing be used. It is better to incise the levator ani muscle across its fibres, so as to make sure of good drainage. No irrigation should be performed for the first day or two; after this the cavity may be washed out with a weak flavine solution, or some other suitable antiseptic. The drainage-tubes should be as large and as numerous as the wound will allow of, and should be shortened at frequent intervals. Some of these abscesses are exceedingly difficult to get to heal.

Perirectal Abscess.

This is the term usually applied to a very serious form of suppuration involving the tissues around the rectum. It is generally a streptococcal infection, accompanied by considerable sloughing, and not infrequently by actual gangrene of the perirectal tissues.

Perirectal abscess may also result from a psoas abscess tracking down into this neighbourhood from necrosis of the pelvic bones, tubercular disease, abscesses associated with the urethra or bladder, and occasionally appendix abscesses. Disease of the prostate and vesiculæ seminales and abscesses due to perimetritis or disease of the tubes may also cause perirectal suppuration.

Fortunately this type of abscess is very uncommon, but it is more serious, and the symptoms are obscure. The patient may complain of some discomfort on going to stool, or pain in the back, which is referred to the sacrum, or to the front over the bladder. It may be possible to feel a boggy mass in the rectum, or to detect fluctuation in the abdominal wall above. The patient will be in a condition of profound toxæmia, with a high temperature and occasional rigors. Disturbance of the urinary function is often an early symptom.

This form of abscess may in a woman follow perimetritis due to a [illegible] cervix, and it is not uncommon after stricture of the rectum. Tubercle occasionally causes it, and it may occur from sloughing of the bowel. I know of one case in which sloughing of the bowel resulted from a nurse administering an enema of almost boiling coffee, the whole pelvis becoming a mass of slough in consequence. The patient ultimately recovered, but with such a bad stricture that the hospital in question had to pension her for the rest of her life. In one case I have seen the rectum slough from putting silver nitrate into a fistula which was not healing satisfactorily.

The only good treatment for this kind of abscess is free drainage, after opening up the space through the ischio-rectal fossa. If that is not sufficient, an opening must be made through the levator ani on both sides. The abscess should be sought for by blunt dissection with forceps or with the finger, as otherwise there is a serious risk of opening the peritoneal cavity, with possibly fatal results. A transverse incision through the fibres of the levator ani is advisable, as otherwise the drainage is apt to be incomplete. It is essential that the abscess should be found and opened at the earliest possible opportunity, for these abscesses are [illegible] serious, and the pus tends to travel upwards, with the result that the abscess sometimes bursts into the peritoneal cavity or one of the [illegible] organs.

Quite recently I was called to see a case where an abscess above a rectal stricture had perforated into the bladder, with the result [illegible] flatus and fæces were passed with the urine, and it had also made [illegible] through the great sciatic notch into the tissues beneath the deep [illegible] and down the thigh. Under the fascia lata there was a huge [illegible] stretching from the anterior superior spine to the knee-joint which contained fæces and flatus. I drained the abscess, but the patient subsequently developed gangrene of the leg, apparently from sepsis [illegible] of the internal iliac artery.

These abscesses should never be opened through the rectum [illegible] be avoided. The largest possible drainage-tube should be used, [illegible] thing done to insure adequate drainage. If the temperature [illegible] up, it is a sign that there is not free drainage. Many surgeons [illegible]

irrigation of the abscess cavity with antiseptics or sterilized water, but personally I am content to trust to drainage alone for at least the first forty-eight hours. Nothing is to be gained by using antiseptic irrigation, and there is the very possible risk of spreading the infection. Local heat, in the shape of frequent large fomentations or poultices, is most useful in increasing the local blood-supply, besides having a marked effect in diminishing the pain. Very hot baths at frequent intervals are invaluable if the patient is not too ill. A smart purge should be administered, and everything possible done to support the patient's strength by food, stimulants, etc.

Rare Forms of Abscess.

Abscesses originating in the genito-urinary tract may find their way towards the rectum and be mistaken for ischio-rectal abscesses. The permanganate test will generally clear up the diagnosis in a case of doubt.

This test consists in injecting a weak solution of potassium permanganate, 1 in 10,000, into the urethra. Under pressure the permanganate solution can be seen to escape at the abscess if there is a communication. Methylene blue may also be used for the same purpose. These abscesses generally result from a neglected urethral stricture or from a prostatic abscess of gonorrheal origin.

A case is recorded by Kalet and Gotte of a woman in whom a pyosalpinx opened at one side of the anus, and pus discharged freely from the fistula. The patient was found to have a double uterus and vagina. Jackson records a very rare case of a man, aged thirty, who for years had suffered from chronic tubercular hip disease, in whom an abscess from the joint had burst into the rectum about 3 centimetres above the internal sphincter. I had a patient in hospital with a tubercular abscess which opened into the rectum, on to the skin in the lumbar region, and in the left popliteal space.

General Treatment of Abscess.

There is only one way in which to treat an abscess in the neighbourhood of the rectum—namely, to open it as soon as it is suspected. A very common mistake is to temporize for a few days, and treat the case with fomentations and hot baths in the hope that the abscess will subside. This treatment will, of course, make the patient much more comfortable and relieve the pain, but the chances that the abscess will subside are so small as to be practically negligible; while, on the other hand, such treatment nearly always results in a considerable increase in the size of the abscess, with the consequent delay in the later healing process, and the certainty of a fistula resulting. It cannot be too emphatically asserted

that the proper treatment is to open the abscess at once, immediately its presence is suspected, and not even wait for fluctuation or other positive evidences of pus.

As soon as the pressure is relieved the abscess ceases to extend, and early incision into an ischio-rectal abscess will often prevent the subsequent formation of a fistula. It is a curious fact that, whereas doctors all agree with regard to the importance of opening abscesses in other parts of the body directly they are detected, they seem to make an exception of ischio-rectal abscess, although this happens to be one of the most important varieties of abscess, requiring early incision.

There being no deep fascia beneath the skin covering the ischio-rectal space, and the skin being particularly tough in this neighbourhood, the abscess tends to reach very large dimensions before it bursts. The patient is thus put to a great deal of pain and distress, and a fistula is almost certainly produced, all of which might have been prevented if an early incision had been made. Even if no pus is found at the time of the incision an abscess will have been saved, and it is far better to open an abscess before the pus has formed than to open one when a large collection of pus is already present.

In these days it is a very simple matter to open such an abscess, all that is necessary being to inject with a sharp hypodermic needle some 2 per cent. novocain into the substance of the skin over an area about as large as a shilling. After waiting five or six minutes for the anæsthesia to be established, a sharp knife can be plunged in through the anæsthetic area point first. This will be quite sufficient to relieve the tension, and if the drainage subsequently proves ineffective, as it probably will, arrangements can be made to open it up properly at a later period.

An incision should be made into the most prominent and indurated area, careful antiseptic precautions being taken. Fomentations should then be freely applied, and the patient treated with frequent soaking in hot baths. It often happens that no actual pus is found on making an incision at an early stage; all that comes out is a small quantity of blood-stained serum. It should not be assumed that the incision was not therefore necessary. On the contrary, the relief of tension will often prevent the formation of pus, and will insure that the abscess never reaches any large size. I should not hesitate to cut into one of these abscesses before any pus had formed. It is said that incisions in this neighbourhood should be made in a radial direction from the anus, but there is no particular advantage in this; the important point is to make an opening which shall remain patent. Some surgeons make only a small opening, and push gauze into it with a probe; this is very painful, and under such circumstances there cannot be good drainage. It seems absurd, after making an opening into an abscess, to go and carefully

plug it up again. I have found the following method of opening an ischio-rectal abscess to be by far the best. It almost invariably prevents the formation of a fistula if properly carried out and if the case has not been left too long. I have opened quite large abscesses by this method, and yet no fistula has resulted. It is very simple; there is no subsequent pain, and it gives the freest possible drainage, which is all that is required.

The patient having been anæsthetized, either by means of a general anæsthetic or by some form of local anæsthesia, a free incision is made into the abscess extending well to the limits of the abscess in either direction. The pus is allowed to flow away, and the skin forming the wall of the abscess is freely cut away. This may necessitate the removal of a large portion of skin, but no harm need be anticipated. The object is to remove the entire skin wall of the abscess; in the case of an ordinary abscess, a circle of some 1½ inches diameter of skin is completely removed. The interior of the abscess is not interfered with in any way. It should not be washed out or a finger passed into it; no plugging is inserted, but a *flat* dressing of antiseptic gauze is applied over the parts.

Having made a good incision and established drainage, there is no advantage in washing the abscess out. It is better to leave it to drain into dressings, which should be frequently changed. If gauze is put into the cavity, healing is delayed. The after-treatment consists in letting the patient sit in a hot bath morning and evening. The parts should afterwards be bathed with 1 in 40 carbolic or monsol, and the wound dressed with a damp dressing. The patient is kept in bed, and in the course of a day or two it will be found that there is no cavity at all, but only a flat wound which has to heal up from the edges. It is extraordinary how rapidly the cavity disappears if treated by this method. It is now universally adopted at St. Mark's Hospital, and it has been found to be better than any other.

It is always well to warn the patient that the condition may become a fistula, and that a subsequent operation may be necessary to cure the fistula.

It is a serious mistake to syringe such an abscess with peroxide of hydrogen, as the amount of gas generated is very great, and the pressure exerted by the gas will do harm and tend to force pus into fresh and hitherto undamaged tissues.

I have seen surgeons open an ischio-rectal abscess in an acute stage when it contains pus, and proceed to perform a radical operation for fistula. They justify their action by saying a further operation would have been necessary, and it might as well be done at once. I do not agree with this, because if the radical operation is done at once an enormous hole is made, and the patient is left quite unnecessarily mutilated; moreover, this procedure does not as a rule prevent the necessity

for a subsequent operation. As the result of leaving it for a fortnight or three weeks there will be a very much smaller wound, which will not require nearly so extensive an operation for its cure, and the resulting wound will heal more easily and quickly, with less risk of permanent disability of the parts. It is never advisable to perform a radical operation for fistula in an acute case.

Treatment of Tubercular Abscess.

A tubercular abscess should be freely opened up in the same manner as for an ordinary acute abscess. The prognosis, however, is different. The patient must be treated generally for tubercle, by feeding up and fresh air, etc. It must not be expected that the abscess will heal unless the patient's resisting power over the tubercle bacillus is good (see remarks under Tubercular Fistula, p. 206).

Septic Periproctitis.

This is a very serious condition, and may prove fatal. It sometimes results as a complication of an acute general disease, such as diabetes, whooping-cough, pneumonia, etc., but it is fortunately rare. I once saw it result from strangulated internal piles. The entire rectum sloughed, and an acute pelvic cellulitis occurred, which ultimately proved fatal in spite of free drainage.

Probably the best treatment in such cases would be an immediate colostomy and free drainage of the pelvis by numerous incisions. As a rule, before the surgeon has made up his mind to subject the patient to a colostomy he is too late to save him.

Generally speaking, these forms of acute cellulitis of the pelvic tissues require to be treated by free incision, and by building up the patient's general health by suitable feeding, alcohol, and stimulants. The patient is best treated in a bath as many hours a day as possible. During the war many such cases, which resulted from bullet and shell wounds, were nursed continually in baths, often for several weeks at a time, with admirable results.

CHAPTER VIII

FISSURE IN ANO

FISSURE of the anus, or, as it is sometimes called, irritable ulcer, is one of the commonest of rectal troubles, and at the same time certainly one of the most painful. It is not in itself a serious affection, and in appearance the lesion, especially to the uninitiated, often appears so trifling as hardly to be worth considering; and yet the pain which it may cause is so severe and prolonged that it often entirely incapacitates the sufferer and renders life a burden.

The records of St. Mark's Hospital show that fissure is rather more common in men than in women, the proportion being about four to three. The lesion consists in a small crack or ulcer situated at the anal margin, at the lower end of which there is usually a small tag or fold of skin. As a rule the fissure is single, and only in exceptional cases is more than one met with in the same patient. The fissure may be found at any part of the anal margin, but by far the commonest position is at the posterior margin; the next commonest position is anteriorly, and only very exceptionally is it found situated laterally. In men it is very exceptional to find a fissure in any position other than posteriorly.

Fissure of the anus almost always results from traumatism of one sort or another, such as stretching of the anus from the passage of hard fæces, a scratch from a fish-bone or some other foreign body in the fæces, or careless cleaning of the parts with hard paper after defæcation, or the careless use of an enema, etc. Small polypi or hypertrophied anal papillæ, if they are so situated that they can get caught in the grip of the external sphincter, may, by the irritation which they set up, give rise to a fissure. In some cases such a condition of affairs may be seen to exist; a small polypus is found lying in contact with one portion of the anal margin, and on lifting this up a fissure is seen beneath it.

The late Sir Charles Ball asserted that the majority of fissures result from the tearing down of one of the small anal valves, or "valves of Morgagni," which are situated in the anus at the muco-cutaneous junction. There are several of these little valves or pouches, and Sir Charles Ball pointed out that if one of these becomes torn down by the passage of a hard mass of fæces, it gives rise to a crack or fissure in the skin similar to the little cracks which are so commonly seen round the finger-nails, and which are usually called "torments."

There is little doubt that this is the method of formation of a few cases of fissure, though it is undoubtedly not the cause of most; for in many cases of fissure the valves can be seen on examination to be intact.

It is not easy to see why the great majority of all fissures are situated at the posterior anal margin. An attempt has been made to explain this in accordance with Ball's theory by saying that the most posteriorly situated anal valve is generally well developed. This, however, seems hardly satisfactory.

It has always seemed to me that the explanation is to be found in the structure of the external sphincter muscle itself. This muscle is not, as has often been supposed, a circular muscle, but consists of a band of muscle fibres arising from the coccyx, which passes forward and splits to surround the anus; in front it is partly inserted into the perineal point and partly continuous with the opposite side. The external sphincter muscle is therefore not really a circular muscle, but consists of two lateral halves (Fig. 73). In front these halves are almost continuous, but posteriorly all the fibres do not join end to end with those of the other side, but are for the most part placed parallel with each other. From the arrangement of the fibres of the external sphincter it will be seen that the mucous membrane and skin of the anal canal are best supported at the sides, and least supported at the posterior commissure, the next weakest place being the anterior commissure. In women, owing to the presence of the vagina, the anterior commissure receives less support than is the case in men.

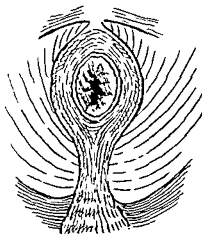


Fig. 73.—Diagram showing the Arrangement of the Fibres of the External Sphincter

The levator ani muscle also assists in supporting the sides of the anus, as the muscle passes on each side to be inserted into the coccyx and sides of the rectum. The two halves of the levator ani muscle give considerable support to the anal canal when it tends to be over-distended, but this support is chiefly confined to the lateral aspects.

It is clear, then, that the weakest point of the anal orifice to any uniform stretching is at the posterior commissure, since here the fibres supporting it are not parallel to the bowel wall. If, therefore, the anus is stretched unduly, the point at which it gives way is the posterior commissure, and the next weakest place is the anterior commissure, since only some of the fibres are circular here. Nearly all fissures are found

CHAPTER VIII

FISSURE IN ANO

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to occur either at the anterior or posterior commissure of the anus, and the great majority are posterior.

The theory that a fissure results from a tear of the mucous membrane occurring at the point which has least support also accounts for the extreme rarity of multiple fissures. There cannot be more than one weakest point, and one would not expect the mucous membrane to give way at more than one point.

I have become quite convinced from a careful observation of numerous cases that this is the true explanation of the formation of a fissure, and that nearly all fissures are, to begin with, simple traumatic lesions resulting from over-distension of the anal canal by the passage of a hard mass of fæces. A further proof that this is the true explanation of the formation of a fissure is afforded by the fact that when the mucous membrane of the anal canal gives way during the process of stretching the sphincter—an accident that may easily happen if the stretching be done too quickly—it always does so at the posterior commissure, showing that this is the weakest point of the muscle. If the sphincter ani is forcibly stretched in the cadaver, it will be found that tearing always occurs posteriorly.

In the great majority of cases a fissure arises without the patient being able to give any very definite cause for it. He often says he first noticed it after an attack of constipation, or he may be quite unable to account for it. A sequence of circumstances which not uncommonly result in a fissure is as follows: The patient for some reason or other is advised to take a daily aperient, such as a morning dose of salts, which results in his having a liquid evacuation. After a year or more of this state of things he gets a slight attack of constipation, and passes a hard stool, with the result that the mucous membrane tears and a fissure develops. The sphincter, like any other muscle, adapts itself to circumstances, and if it is not required to relax the anal opening more than a very little for a long period it contracts, and when suddenly called upon to relax to a normal extent a tear results. In a certain number of cases a fissure is found to have arisen secondarily to some other lesion, such, for instance, as an attack of proctitis, or after an attack of acute external thrombosed piles. In some cases, again, the fissure may be said to have a specific origin. It may be syphilitic, and then it is usually associated with the presence of condylomata round the anus and there is more than one fissure. Or it may be tubercular, in which case it soon extends and develops into an ulcer, spreading over the anal margin on to the skin.

The skin at the lower end of an ordinary simple fissure tends to become swollen and œdematous from the lymphatics being blocked by the inflammatory changes in the base of the fissure. This results in the formation of a tag of skin at the lower extremity of the fissure, often called a " sentinel pile." This small swelling at the lower end of the fissure has no relation-

ship to piles, but, as already explained, is merely an œdematous skin tag at the anal margin. The tags or sentinel piles are not always present, but are generally to be seen in fissures of old standing.

Symptoms.—The chief symptom in the majority of cases is pain coming on after an action of the bowels. The pain is often extremely severe, and, indeed, it is quite astonishing how much pain may result from a minute fissure. It is quite common to see patients incapacitated from following their usual occupations, and rendered miserable by the pain which follows any action of the bowels. The pain may come on immediately after the bowels have acted, or it may not come on for half an hour, or even longer, in some cases. It often lasts for several hours, and sometimes for the rest of the day. Many patients are almost unable to sleep at night on account of the shooting pain caused by involuntary spasm of the sphincters, which occurs just as they are falling off to sleep.

The severity of the pain varies considerably in different cases; it is often most acute in fissures which have only existed for a comparatively short time. Where there is a small recent fissure the pain is often very severe owing to the fact that a nerve ending has become exposed, the least contact with which by the fæcal contents of the bowel will set up acute pain and spasm of the sphincter muscle. After a fissure has existed for a long time the edges become much indurated, and the fissure itself assumes more the character of a chronic ulcer with a granular base. In fissures of old standing the muscular fibres of the sphincter can often be seen exposed in the base. A fissure frequently gives rise to pain in the lower part of the back and in the thighs, which is described by the patient as being of a dull, aching character. Pain of this kind is perhaps more often associated with an old-standing fissure.

Pruritus ani is frequently present in cases of fissure, and may sometimes be the only symptom complained of.

Patients with fissure often say that they have noticed that the fæces are streaked with blood. The quantity of blood, however, seldom amounts to more than a drop or two.

Reflex Symptoms.—The reflex symptoms associated with fissure are curious, and may be very misleading. They are most usually associated with the genito-urinary organs; in some cases, however, the pain may be referred down the thigh, and a case of fissure has sometimes been diagnosed as one of sciatica. A patient was recently under my care at St. Mark's Hospital whose chief complaint was difficulty in passing urine. He had all the symptoms of a urethral stricture, and could only micturate after considerable straining. A catheter passed quite easily, and there was no sign of any urethral stricture; but on examining the rectum I found a small, acute fissure of the anus situated anteriorly. On this being cured, the whole of the urethral symptoms disappeared.

In women pain referred to the uterus or vagina is a common accompaniment of anal fissure; dysmenorrhœa and other uterine symptoms may easily lead to a wrong diagnosis, and much time may be wasted in futile treatment for supposed uterine trouble when the real cause of all the symptoms is to be found in an anal fissure.

On account of the pain which results from defæcation, many patients with fissure put off relieving the bowels as long as possible, and the resulting constipation often greatly aggravates their condition, besides resulting in much increase of the pain when defæcation ultimately takes place.

A fissure may be complicated by polypi or hæmorrhoids, and no examination should be considered complete without investigation of the rectum above the fissure, as the presence of such complicating conditions has an important bearing upon the treatment of the fissure. In some old-standing cases of fissure very little pain is complained of, and with a little care the patient is able to keep himself free from discomfort, and consequently he is often very unwilling to undergo any operation for the cure of his trouble.

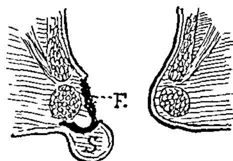


Fig 74.—Diagram showing in Section a Fissure with a Fistulous Track passing from its Lowest End and tracking towards the Perianal Skin

F, Fissure; S, sentinel pile.

It is, nevertheless, a mistake to leave such fissures, as in course of time they are very liable to set up a chronic pruritus, which may be difficult to cure. In one or two instances I have known a fistula develop as the result of an old and neglected fissure, and I believe that chronic fissures are a not uncommon starting-point of fistula (Fig. 74).

Fissure of the anus, or irritable ulcer, can be conveniently divided into two classes—acute and chronic.

In the acute cases the fissure is of recent date, and is frequently very small. The pain, however, is out of all proportion to the severity of the condition, and is often extreme. The fissure in these cases amounts to little more than a crack in the mucous membrane.

In the chronic cases the fissure is of long standing; it may have been present for months or even years. The fissure in these cases is of some size, and is more of the nature of an ulcer. The edges are hard and indurated, and not infrequently the fibres of the external sphincter can be seen exposed in its base.

The amount of pain and general discomfort which may be caused by a simple fissure of the anus is sometimes quite extraordinary, and I have seen patients who have suffered tortures from an insignificant-looking

fissure of the anus, which could have been cured by a surgeon in a few days.

Examination of a Case of Fissure.—Patients suffering from painful fissure are naturally very loth to be examined, and unless special precautions are taken against causing pain, it will generally be found impossible to carry out the examination properly on account of the extreme pain set up by the least attempt to handle the parts. It is, nevertheless, of considerable importance to make an adequate examination in order to ascertain whether there is any complicating condition, such as piles, a sentinel pile, etc., before proceeding to treat the case. It is well to remember in dealing with such cases that a fissure is excessively painful, and that if one causes the patient a great deal of pain, one is not likely to gain his confidence or his respect for one's surgical ability.

The best position for examination is the left lateral, semi-prone position. The buttocks should first be gently separated to enable one, if possible, to see the fissure. The lower end, at any rate, can generally be seen quite easily, and if care is taken to use the utmost gentleness, no pain should be caused. The next thing is to pass a finger into the bowel in order to ascertain the conditions above the fissure. This may sometimes be done without causing pain by keeping the pulp of the finger towards the fissure and pressing in the opposite direction. Very frequently, however, it is not possible even with great gentleness to do this on account of the pain caused. When it is obvious that a proper examination is impossible without causing pain, the best thing to do is to inject a few minims of a 2 per cent. solution of novocain into the tissues beneath the fissure. This is quite easily managed with a fine hypodermic needle without causing any pain, and after about five minutes the parts will be found to be quite insensitive and a thorough examination can be made without any distress to the patient.

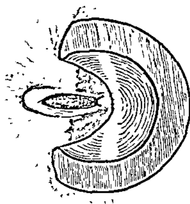


FIG 75—DRAWING OF A FISSURE AS SEEN WITH THE AUTHOR'S ANAL SPECULUM IN PLACE.

Note small polypus at upper end, and œdematous tag at outer end.

A small speculum can then be introduced, the best type for this purpose being the speculum illustrated on p. 31 (see also Fig. 75).

Treatment.—Fissure in ano is a condition which can almost invariably be cured both readily and effectually, and I know of no more grateful patients than those who have been cured of this painful affection.

A very large number of all cases of fissure can be cured without operation, but it is important to know which are the cases where a cure can be reasonably expected without any operative interference. As a rule it may be said that fissures situated anteriorly or laterally can be cured without operation. Fissures of recent origin can usually be successfully cured by palliative means—that is to say, fissures which have only existed for a short time, which have not indurated edges, and in which the fibres of the underlying sphincter muscle are not exposed. Such fissures will generally heal readily without surgical operation. Again, fissures in children or young adults are almost always curable by palliative means. On the other hand, fissures which have existed for a considerable time, and the edges of which are thick and indurated, or which have a small polypoid growth at their upper extremity, or in the base of which the fibres of the sphincter muscle can be seen, most usually require an operation for their cure.

Fissures, too, which are complicated by much hypertrophy of the external sphincter, so that the latter muscle feels almost like a ring of cartilage beneath the skin, are best treated either by divulsion or excision of the fissure. Cases of fissure complicated by hæmorrhoids or fistulæ always demand operation.

It is not to be supposed that such cases of fissure as are here mentioned as requiring operation can never be cured by palliative means; undoubtedly a certain number of them can, but operation is the most satisfactory method of treatment, as complete failure or a rapid recurrence of the trouble will most commonly follow attempts at palliative treatment in such cases.

Non-Operative Treatment.—A certain number of fissures will heal by means of simple remedies. Care should be taken to regulate the patient's bowels so that the stools are soft and unirritating. For this purpose nothing is so satisfactory as full doses of petroleum, combined if necessary with some mild aperient such as cascara. The object should be to render the fæcal contents quite soft. The patient should be told not to walk about more than is absolutely necessary, and if he can do so, he should remain in a recumbent position during a large part of the day. One of the following ointments should be introduced, either with an ointment introducer or with the finger, in the morning and after each action of the bowels:

I

℞	Subnitrate of bismuth	2 drachms.
	Cocaine	10 grains.
	Subchloride of mercury	15 "
	White vaseline	1 ounce.

II.

℞	*Cocaine hydrochlor.*	6 per cent
	In olii ricini	

III.

℞ Subchloride of mercury ...	... ...	4 grains.
Powdered opium	... ...	2 „
Extract of belladonna ...	... ...	2 „
Vaseline ...	... ...	½ ounce

The patient should arrange to have a hot bath immediately after an action of the bowels, and then to lie down for twenty minutes.

Although this treatment will generally quickly allay the pain and make the patient very much better, my experience has been that it is only in exceptional cases that it results in a cure of the fissure. More frequently, after a period of immunity from symptoms lasting from a few weeks to two months, the old pain recurs, and something further has to be done.

The injection of oily solutions of anæsthetic substance has been used quite successfully in the treatment of fissure.

The solution first used was benacol; this was described by Yeomans, who reported a number of cases treated with it. Gabriel in 1929 suggested the use of a solution which he called A.B.A., the formula of which is:

Anæsthesin	... ...	3 per cent.
Benzyl alcohol	... ...	5 „
Ether ...	... ...	10 „

In sterilized olive oil.

This solution is put up in sealed glass ampules ready for use.

The method of using it is as follows: The hair is removed if present in excess and the skin iodined, and with a fine hypodermic needle and 2 per cent. novocain a blister is made in the skin about an inch away from the anal margin. Another syringe containing 5 c.c. of the A.B.A. solution and a 2-inch exploring needle is now taken in the right hand. The first finger of the left hand is introduced into the rectum and the needle is pushed through the skin at the situation of the blister. The blister prevents the pain of the large needle which must be used on account of the oil.

Guided by the finger in the rectum, the needle is pushed into the deep parts and the anæsthetic solution is distributed through the tissue under that portion of the skin it is desired to anæsthetize and behind the fissure. The solution must be fairly evenly distributed and not pooled in one place, and it should not be placed just under the skin or mucous membrane. The amount injected varies from 3 to 8 c.c. Personally I seldom inject more than 5 c.c. at a sitting, and the same area should not be injected for several weeks. The injection should not be painful and should give great relief, lasting several days or a week, which is often long enough to get the fissure well on the way to healing. Pain for an hour or two is

sometimes complained of, and is due, I believe, to pooling of the solution in one place.

I have tried various applications to the fissure; in some cases a very little pure nitric acid applied in the first instance is effectual; in others the best results are obtained by the application of pure ichthyol, or solution of nitrate of silver. In any case, the patient will have to be seen almost daily until the fissure is healed, and it is generally a question of three or four weeks before complete healing is obtained. It is unnecessary to point out that it is useless to try these methods if there is a sentinel pile, a polypus, or any other complicating condition.

This method of local applications through a speculum is much the best of the non-operative methods of treating fissure, and I have certainly obtained excellent results from it in some cases. It is, however, not so certain as operation, and the time required is often longer.

Operative Treatment.—The patient is prepared for operation in the same way as in the case of the operation for piles, and placed in the lithotomy position so as to give a good view of the parts. The sphincter is then carefully stretched and the bowel washed out with soap and water, and subsequently with an antiseptic, a little iodine or pure carbolic acid being applied to the fissure itself. If small, the fissure is then completely excised, care being taken, however, not to cut deeply into the external sphincter nor to remove more tissue than is absolutely necessary. Or the more usual method is to make an incision starting at the upper end of the fissure downwards and dividing it well out on to the skin. If a sentinel pile is present this should be simply cut off. The edges of the wound thus made are then trimmed off with scissors, together with any thickened edge of the fissure and the œdematous tag, which often exists at the lower end. One's aim should be not to leave a slit-like wound, but rather a flat, open, oval wound, two-thirds of which should be on the skin outside the anus and only one-third within the bowel (Fig. 76). This will often necessitate making what appears to be an unnecessarily large incision. The object of the incision is to provide adequate drainage to the whole of the fissure, not only immediately after the operation, but until such time as the fissure is completely healed. It will be found that the skin part of the incision almost always heals more rapidly than that part of the wound which lies within the anal canal. Unless, therefore, that part of the incision which lies in the skin is considerably larger than the anal portion of the wound, drainage will become ineffective during the latter part of the healing stage, which may easily result in the fissure failing to heal entirely.

Great importance used to be attached to dividing the external sphincter in operating for fissure, and it was supposed that the fissure healed owing to rest being given to it by division of this muscle. I believe that this

After-Treatment.—The wound should be dressed twice daily after the first twenty-four hours. The patient should sit in a hip-bath and soak the parts, and then the wound should be dressed with a small piece of cotton-wool soaked in sterilized olive oil. The patient should be kept in bed or on a sofa until the wound has quite healed. The bowels should be kept acting daily by some mild aperient.

As a rule healing takes place in about a fortnight to three weeks. If the patient is allowed to walk about before healing is complete, it is more than likely that the time before the wound has healed will be very much prolonged.

Causes of Delayed Healing.—Cases are occasionally met with where, although the wound looks quite healthy, healing does not occur, or occurs extremely slowly. There are several causes which may be responsible for this, such as too firm plugging of the wound or the application of strong antiseptics. The frequent application of stick nitrate of silver with the object of stimulating the wound I have often seen cause considerable delay in healing. Syphilis may be responsible for delay in healing, as may other constitutional conditions, such as gout and Bright's disease. In such cases treatment should be directed to the general condition, and a change to the seaside or country will often assist healing. By far the commonest cause of the non-healing of a fissure wound is inadequate drainage during the final stages. This often results if the surgeon does not make a sufficiently large incision in the skin at the initial operation.

CHAPTER IX

INFLAMMATORY CONDITIONS

It is a curious fact that both acute and chronic inflammatory affections of the mucous membrane lining the rectum bear a close resemblance to similar affections of the throat and pharynx. Thus, one sees the ordinary appearances of chronic pharyngitis exactly reproduced in the rectum in many forms of chronic proctitis. In cold temperate climates, such as that of Great Britain, the commonest forms of simple catarrh of mucous membranes occur in the throat and nose; while in tropical climates—in India, for example—they more frequently occur in the rectum and colon.

Proctitis.

Proctitis, or inflammation of the rectum, is characterized by redness and injection of the mucous membrane, an increase in the secretion of mucus, and swelling of the submucous layer, which causes an increased folding and œdematous appearance of the mucous membrane. We are able to recognize a considerable number of different types of proctitis, both acute and chronic, although at present we do not know the significance of all the different types, and there still remains much work to be done by careful observation.

Simple Catarrhal Proctitis.

This is generally an acute condition with a sudden onset, and is in many ways similar to the so-called cold in the head, which is such a common affection in large communities.

Symptoms.—The onset is usually sudden, and as a rule the first sensations are localized to the bowel. Occasionally, however, the patient experiences prodromal symptoms, such as acute pain in the body, and a feeling of chilliness similar to what is often experienced with the onset of a coryza. There is generally a feeling of heat or weight in the rectum, accompanied by a sudden desire to go to stool, and often diarrhœa. Tenesmus is characteristic of proctitis, and if the condition is at all acute will be of a severe type. If the condition is accompanied by a colitis, as is frequently the case, diarrhœa will be a prominent symptom; but if the inflammation is localized to the rectum itself there will be tenesmus, but with no accompanying action of the bowels beyond a little mucus, and perhaps blood. The ordinary attack of acute diarrhœa is due to

simple catarrhal colitis and proctitis. Pain in the back and pelvis is often complained of, and in severe cases there may be frequent micturition, due to the sympathetic effect upon the bladder. During the acute stage of the attack blood may be passed in the stools, and this is especially marked when there is tenesmus. Mucus is always present in excess; the anus and rectum become exceedingly tender, and examination is rendered extremely difficult. The erect position accentuates the symptoms, and the recumbent position is always the most comfortable. The patient feels ill and weak, and there is often gastric disturbance, with pain after meals, and possibly sickness. If the mucous membrane is examined during the acute stage, it will be seen to be red and inflamed, somewhat swollen, and with much glairy mucus.

Etiology.—In most cases the cause appears to be some bacterial infection of the mucous membrane, the exact nature of which we often are unable to discover. Probably many different kinds of bacteria are capable under favourable conditions of causing proctitis. Owing to the large number of micro-organisms which are habitually present in the rectum, even under normal conditions, the difficulty of ascertaining which is the specific cause in any individual case of proctitis is very great; and we are still in the dark as to the exact nature of the infection, except in a few exceptional cases, where some particular micro-organism is found to be present in almost pure culture. The only cases of this which I have observed have been those of pneumonic proctitis, which is, fortunately, a very rare disease, and gonorrheal proctitis.

Certain drugs, if taken in excess, will cause proctitis; moreover, some patients are very susceptible to one or other of these drugs, and will get an attack of proctitis from quite small doses which would cause no inconvenience to a normal individual. Among the more important of these drugs may be mentioned calomel, and all the preparations of mercury, the more violent purgatives, arsenic, and nux vomica; the latter drug, even in quite small doses, will sometimes cause violent diarrhœa in particularly susceptible individuals. I have seen two cases where an acute, and for a time intractable, diarrhœa was traced to the administration of quite ordinary doses of nux vomica which had been prescribed in a tonic.

Exposure to cold or wet, or sitting on cold stones, is often the apparent cause of proctitis, although it can, of course, only be an exciting cause, and some other factor, such as an infection, must be present. Ptomaine poisoning and the eating of certain fruits seem to cause the condition in some persons. Threadworms are a not uncommon cause in children.

Local irritation of any sort may set up a proctitis, and it is usually present in cases of impacted fæces in the rectum, and may occur as a sequel to severe constipation due to local irritation caused by the undue

retention of solid material. Injections into the rectum may cause proctitis, and rectal feeding, if not carefully managed, is liable to induce the condition.

Apart from the fact that proctitis is much commoner in hot than in temperate climates, certain individuals have a special tendency to attacks of proctitis on very slight provocation. I shall have occasion to mention this again when speaking of chronic proctitis. Foreign bodies in the rectum may be the cause of proctitis, and it is always advisable to make a digital examination of the rectum to ascertain whether this cause is present. I know of one case where the patient was treated for three weeks for severe septic proctitis before it was discovered that there was a broken egg-cup impacted in the lower part of the rectum.

Treatment.—The first obvious necessity is to ascertain the cause of the condition, if possible; at any rate, to exclude those conditions which are purely local, such as impacted fæces, the presence of a foreign body, etc.

If a foreign body is found, its removal is obviously the first necessity. This cause being eliminated, the bowel should be cleared out so as to



Fig 78

remove any infective material it may contain, and for this purpose we may use either a saline draught or a simple enema. As a rule, enemata made up with weak gruel are the least irritating and the most easily retained. The patient should be confined to bed and kept warm. A hot-water bottle applied over the sacrum and buttocks often gives considerable relief from the constant tenesmus. Irrigation of the rectum with cold water, to which ½ ounce of hazeline has been added, gives much relief if the parts are not too tender to allow of the passage of an irrigator. With care, it will usually be possible to pass a soft rubber Jacques catheter No. 12, to which a tube and funnel have been attached, and by means of this the bowel may be irrigated quite easily without causing the patient any pain, the fluid being allowed to flow in slowly and then siphoned out through the same tube. Another method of irrigating the bowel is to use a two-way rectal tube of soft rubber (Fig. 78). In severe cases any of the following astringent injections may be tried: Glycothymolin, 10 per cent., argyrol, ½ to 1 per cent.; hazeline, 2 drachms to the pint. Kaolin irrigations may be used, and should be very effectual in acute cases of proctitis (see under Ulcerative Colitis, p. 469).

In addition, suppositories of morphia and belladonna often give great relief, and enable the patient to sleep at night. An injection into the bowel of starch 4 ounces, opium 1 grain, is very soothing.

The diet should be simple and free from cellulose or other ingredients which will leave a hard residue. Milk, on account of its liability to cause fermentation and gas, and to leave hard scybala in the colon, is best avoided. Soups and gravies are also bad. The diet should consist of rice pudding, custard, fish, jelly, eggs, etc., after the more acute symptoms have passed off. Liquid petroleum, in teaspoonful doses three times a day by the mouth, is very useful in acting as a dressing to the inflamed mucous membrane, and in preventing the formation of hard scybala. The patient should be kept in bed or in a warm room for some time after all the symptoms have subsided, and should be careful with regard to diet for some months.

Gonorrheal Proctitis.

This is always due to direct infection of the rectum or anus through some slight abrasion of the surface by the gonococcus. The infection may be direct, and is probably always so in men; but the disease is more commonly seen in women, and may then be due to infection spreading backwards from the genital passage.

It is very doubtful if infection can occur on an intact mucous membrane, but there is no absolute proof of this. In most cases the parts involved are the anal canal and some 3 to 4 inches of the rectum itself. Microscopic examination of the discharge should show the presence of gonococci in large numbers, but secondary infection with other organisms is generally present.

It is probably this secondary infection which renders the condition in a few cases so slow in healing. The condition does not seem to be at all common, as judged by the number of cases seen in private and hospital practice, but it is probable that in most cases medical treatment is not sought by the patients, owing to their being ashamed of their condition and wishing to keep it secret. Even when quite untreated it tends to get well fairly quickly as a rule, and is self-limited in extent.

Symptoms.—These begin by discomfort and irritation in the parts from one to five days after infection. Severe burning pain and often violent tenesmus accompany the acute stages of the infection. There is a profuse yellow purulent discharge which may be blood-stained. Defæcation is exceedingly painful. During the acute stage of the disease there will be a rise of temperature and other constitutional disturbances.

An examination with a speculum or the sigmoidoscope shows a very bright crimson appearance of the mucosa of the rectum for several inches. The mucosa is œdematous and covered with pus. Some ulceration of

the surface may be present, but is not a marked feature, unless severe secondary infection has occurred.

When one suspects gonorrhœal infection, a swab should be taken of the pus. This is best done through a speculum from the surface of the infected mucosa. The appearances are fairly characteristic of the condition, and in women an infection of the vulva will probably also be present.

Although the symptoms are very acute, the disease clears up fairly quickly as a rule, and I have never met with a case of stricture of the rectum resulting from it when proper treatment was carried out. But there is good reason to think that many of the cases of fibrous stricture of the rectum which have in the past been attributed to tertiary syphilis are really the result of gonorrheal infection accompanied by secondary sepsis in patients who have not been treated at all during the acute stage or have not been properly treated (see Chapter X.).

Treatment.—This consists in douching out the rectum at frequent intervals, at first with bland solutions, and later, in the more chronic stages, with 1 per cent. protargol or nitrate of silver, 10 grains to the ounce. As there is usually severe pain and tenderness, it is necessary to give sedatives to allay the pain, either in the shape of belladonna and morphia suppositories, or, better, hypodermic injections of morphia, as the introduction of the suppository is often a painful process.

If the condition is diagnosed at an early stage, it may be worth while to attempt to abort the disease by strong injections of potassium permanganate.

Chronic Proctitis.

Chronic proctitis may follow an acute attack, but it often makes its appearance quite insidiously and without any traceable cause. Not infrequently it occurs as the result of an acute colitis, or as the terminal feature in ulcerative colitis. I have also frequently seen it as the result of an attack of dysentery contracted in India or some other tropical climate. It appears sometimes to occur in association with chronic suppurative appendicitis, and to be only cured by the removal of the appendix. Doubtless in such cases the appendix is constantly discharging organisms into the colon which keep reinfecting the bowel.

Symptoms.—These are much the same as in the acute forms, but tenesmus is not usually a prominent feature, except during acute attacks. Commonly there is a feeling of weight in the rectum, and the patient is always conscious of this portion of his anatomy, and feels as if the bowel were not empty. The patient usually suffers from chronic diarrhœa, with loose, watery evacuations; and any slight cause, such as a hot cup of soup, or even a cup of tea, will often bring on an immediate attack

is then withdrawn over the base of the electrode, so as to leave it in place. A little cotton-wool is packed round the ends to make everything watertight, and to prevent any possibility of contact between the terminal on the electrode and the skin. A solution of zinc sulphate, 4 grains to the ounce, is next injected with a funnel and tube, through the tube of the electrode, so as to distend the bag within the rectum. The latter should be distended until it is in contact with the whole of the rectal wall, but not enough to burst the membrane or to cause the patient serious discomfort. The positive pole is then attached to the terminal on the electrode. The negative electrode usually consists of a large flat piece of lead covered with several layers of lint soaked in a warm saline solution, care being taken to see that there is a sufficient thickness of lint between all parts of the metal and the skin. This electrode should be as large as conveniently possible, and should be applied over the back of the patient and kept in place by several towels. This electrode is attached to the negative pole.

The connections having been made, the current is turned on until the metre shows about 20 milliamperes. After the current has been passing for a few minutes the resistance decreases, and it will be found that the metre is showing about 30 milliamperes. The current should not be increased above this, and should be allowed to pass for about ten minutes. It should be kept as steady as possible, anything in the way of sudden alterations in the current being particularly avoided, as they will cause the patient unpleasant symptoms. Personally, I often use a much smaller current than this, and allow it to pass longer; 8 to 10 milliamperes for about twenty minutes is often just as effectual, and does not cause so much discomfort.

When the time for the application has expired, the current should be slowly reduced to nothing, and the switch should never be thrown out suddenly. The fluid should be allowed to run out of the membrane bag, which can then be withdrawn.

A little ointment squeezed into the bowel will complete the treatment. The treatment causes no pain, but not infrequently sets up a somewhat violent tenesmus, with the result that the patient gets an almost uncontrollable desire to void the contents of the rectum.

When this treatment was first introduced, it was usual to administer an anæsthetic. I have, however, found this to be unnecessary, and now I generally administer a hypodermic injection of morphia about twenty minutes before the treatment, and I find it is usually possible to carry out the treatment quite effectually without causing the patient any inconvenience whatever. Morphia has the advantage that it delays the spasm, and the patient is not bothered with an urgent desire to evacuate the rectum after the treatment, which is otherwise not at all unusual.

The patient should lie perfectly quiet for about three-quarters of an hour after each treatment, as any attempt to move about tends to produce tenesmus; this soon passes off, however, and no further inconvenience is felt.

The applications are best made at intervals of about a week or ten days, the time depending, of course, upon the appearance of the rectal mucosa, which should be examined from time to time with the proctoscope.

The results of this treatment in suitable cases are very satisfactory. In cases which are seen in an early stage it often results in a cure of the condition after one or two applications, and in the more severe and chronic cases excellent results follow a series of treatments extending over some weeks. The mucous membrane rapidly begins to take on a normal appearance and the symptoms to subside. As a rule, there is marked improvement after each application, with a tendency to relapse at the end of a week or ten days, and another application should, if possible, be made before this relapse occurs. No doubt this tendency to relapse is due to the fact that some of the foci of infection have escaped the action of the drug, and tend to restart the condition. On each successive treatment more and more of these outlying foci are affected until, after several applications, the disease is entirely eradicated. This treatment is so much better than the tedious washing out of the rectum with drugs hitherto used that, whenever possible, it should be undertaken. It is quite useless to attempt this treatment with inferior apparatus, and without a knowledge of the use of the galvanic current. If not carried out properly, the only result will probably be to cause the patient a great deal of pain and discomfort, and possibly to cause blisters in the bowel.

Where an apparatus is worked from the main current supply, special care should be taken to see that there is proper precaution against the breakdown of the resistance, or dangerous results may follow if such a breakdown occurs suddenly while the current is passing, and allows a heavy current to be discharged through the patient. If it is found impossible to keep the current steady through the treatment, the apparatus is not working properly, and no good will result from the application. There is no object in using very powerful currents, and, on the other hand, they are apt to cause lesions in the mucous membrane.

There are two forms of apparatus commonly employed in this treatment. One is that worked from the main current supply, which is made safe owing to the fact that the current passing through the patient is an induced current, and not part of the main supply. The other apparatus is suitable where it is desired to have a portable apparatus, and the current in this case is supplied by a number of dry cells. As this apparatus is rather apt to get out of order if not constantly in use, it should be carefully tested before each treatment, or it will be found that there is not sufficient current available.

Another solution which may be used in this treatment is that recommended by Curtis Webb, which consists of silver nitrate, $\frac{1}{10}$ per cent. The objection made to the use of silver solutions is that they often cause more pain. Moreover, silver nitrate is a salt which is not so easily split up by the electric current as is zinc sulphate.

The following case will serve as a typical example of the results of this treatment:

Case.—E. B., a gentleman aged fifty-one, consulted me for symptoms of chronic proctitis, which had been worrying him for about three years. He had been resident in India for many years, and had had dysentery on two occasions. Ten years ago he had been operated on for liver abscess. The last attack of dysentery took place three years before he saw me, and his symptoms seemed to have dated from that attack, although they had been most severe during the last year. He was in fairly good health, but he had had about five or six loose stools a day, with a certain amount of rectal irritation and tenesmus. Various treatments had been tried in order to control the diarrhœa, but without any permanent effect.

On examination with the electric proctoscope, the mucous membrane was seen to be ulcerated for about 5 or 6 inches above the anus. The ulceration was only superficial, and the appearance was rather as if the surface of the mucous membrane had been excoriated. Above this the bowel was apparently normal. He was treated by zinc ionization, and felt considerable benefit after each application. The current was passed for from ten to fifteen minutes, from 6 to 8 milliamperes being used, and the treatment was given at intervals, first once a week, and later once every fourteen days. After eight applications the symptoms entirely cleared up, the bowel returned to a normal condition, and he had no further trouble. He has remained well since.

Hæmorrhagic Proctitis.

It is only since the introduction of the electric proctoscope that it has really been possible to detect this disease as a separate entity. I have now, however, seen a sufficient number of cases to be certain that this is a disease of the rectum which stands in a class by itself, and one which it is important to recognize. I feel sure that other rectal surgeons must have met with cases of the disease, but they may possibly not have met with a sufficient number to classify them. The disease is in many ways a curious one, and, as I shall point out, it is of vital importance that it *should be definitely recognized.*

The condition is a rare one, which appears to be confined to young adults, usually women. It is distinguished by profuse hæmorrhage from the rectum. The patients are nearly always young women between the ages of twenty and thirty. The bleeding is often *considerable in quantity*, and the patients become seriously anæmic unless it can be stopped. The

etiology is at present unknown, but the condition appears to occur in otherwise healthy individuals—in fact, the patients are often in excellent health apart from the bleeding and its consequences. In one or two cases there has been a history of bleeding in other members of the family. In one case the patient had a sister who suffered from constant metrorrhagia, and in another case a sister of the patient had died from hæmorrhage from the rectum some years before.

It is particularly important that this condition should be recognized, as it is frequently mistaken for piles, and in several cases I have known of the patient being operated upon for piles without any relief to the symptoms. One patient had been operated upon twice without the hæmorrhage being cured. The condition can only be satisfactorily detected by examining the interior of the rectum with a tubular speculum or electric proctoscope. It will often be seen that the mucous membrane is spongy in appearance and dark red in colour. It frequently looks as if the surface had been sand-papered. Blood can be seen oozing from the entire surface, and there is often an accompanying excess of mucus. Occasionally there are definite ulcers, but never of any large size or depth. The exact appearances will depend very much upon the stage the disease has reached when the examination is made. Blood oozes from the surface on the slightest provocation, and the passage of a stool is usually sufficient to cause quite free hæmorrhage. In some cases there is free bleeding apart from defæcation. The other symptoms are those of a mild chronic proctitis—that is to say, there is often frequency of stools, some of the patients having to go to stool four or five times a day. Sometimes there is no increased frequency of the stools, but in all cases there is frequent bleeding. The blood is usually bright in colour, and resembles that of an ordinary case of bleeding piles. This condition may affect only the rectum, or the whole colon and rectum may be involved. The hæmorrhages may be so serious as to threaten an immediate fatal issue, but more usually the patient becomes profoundly anæmic from repeated hæmorrhages.

It is seldom that more than the last 3 or 4 inches of the rectum are involved. In none of the cases I have met with has the patient shown any tendency to undue bleeding from other parts. I have not been able to prove that these cases of hæmorrhagic proctitis are due to any definite infection. The condition is not accompanied by any rise of temperature or febrile disturbance.

The following case will give a good idea of the condition:

Case.—A young lady, aged twenty-three, was perfectly well and healthy until two years ago, when she began to have bleeding from the rectum after every stool. She was operated upon for piles. The bleeding ceased for a month or two and then recurred. A year later

she was operated on again, with the same result. After this the bleeding was worse than ever. She lost a considerable quantity of blood every day, and often had five or six stools, consisting mainly of blood and mucus, in the course of the twenty-four hours. There was no pain or discomfort, nor any other symptom apart from the bleeding. She was rather anæmic, but otherwise healthy. Examination with the sigmoidoscope showed a typical hæmorrhagic proctitis involving most of the mucous membrane of the rectum. A sister had died from chronic hæmorrhage from the bowel.

The patient was admitted to St. Mark's Hospital and treated by ionization with zinc sulphate. Four treatments in all were given at intervals of four days to a week. After this the bleeding entirely stopped, and the mucous membrane resumed a normal appearance. The patient was heard from four months later, when she stated that she had had no further hæmorrhage, and was in perfectly good health.

This condition is often confused with ulcerative colitis, but I am sure that it has no connection with colitis and is not due to an infective process.

Treatment of Hæmorrhagic Proctitis.—The condition is a very difficult one to cure, as, although it is generally possible to stop the hæmorrhage without much difficulty, there is a marked tendency to recurrence. The patient should first be thoroughly examined, and for this purpose it is usually advisable to administer an anæsthetic. It is then possible to make certain that there are no polypi or adenomata responsible for the bleeding.

Very good results have been obtained in several cases by rectal injections of silver nitrate. At first these injections should not be stronger than ½ or 1 grain to the ounce, but should be gradually increased in strength as toleration is obtained.

Irrigating the bowel daily with strong solutions of hazeline and cold water will also frequently succeed in controlling the bleeding. Perhaps the best method of treatment is electric ionization of the bowel with zinc sulphate. One or two applications of this treatment usually controls the hæmorrhage, though further treatment at increasing intervals is necessary to prevent a recurrence of the bleeding. The patient should be given calcium in some assimilable form and injections of thrombokinase, such as hæmoplastin or some similar preparation.

As already mentioned, there is a marked tendency to recurrence, and it is most important that these cases should be kept under careful observation, as the hæmorrhage is often severe, and in a short space of time the patient becomes seriously anæmic.

When the colon is involved it may be necessary, and often is, to perform appendicostomy so as to be able to control the bleeding. A full description of hæmorrhagic colitis will be found in the chapter on ulcerative colitis.

Ulcerative Proctitis and Inflammatory Conditions of the Anus.

Ulcerative proctitis is the most serious type of proctitis that we have to deal with, and may be the terminal condition in an acute or chronic proctitis if either of these is neglected or fails to respond to treatment. Most of the specific forms of proctitis are of the ulcerative type, and in addition to these there are a large number of ulcerative conditions of the rectum which require consideration. Nearly all the different kinds of ulceration which are found in different parts of the body may also be seen in the rectum, and with the electric proctoscope we are able to distinguish many different kinds of ulceration in the lower bowel. Our knowledge is still somewhat deficient with regard to many of these types of ulceration, but much work has recently been done in this direction.

Etiology.—There are a great number of different causes of rectal ulceration, and the following classification, which was that adopted by the late Dr. Tuttle, is, I think, as good as any. He divided ulceration of the rectum into the following varieties: Traumatic, catarrhal, varicose, hæmorrhoidal, follicular, strictural.

Specific Forms of Ulceration.—Tubercular, venereal, dysenteric, diphtheritic, and carcinomatous.

Systemic Forms of Ulceration.—Nephritic, diabetic, trophic, hepatic, marasmic.

Unfortunately classifications are not of very much practical value, and many of the types of ulceration actually met with are a mixture of several of the varieties mentioned. By far the commonest cause of ulceration of the rectum is infection of the tissues by pyogenic micro-organisms. The lesion through which the infective material obtains an entrance is often some minute crack or abrasion, and is frequently untraceable. The condition of the patient's general health is also an important factor, and naturally patients who are weakened by disease, starvation, hardship, etc., are more liable to contract ulceration when infection occurs.

In the pre-antiseptic days ulceration of the rectum was a common and serious disease, but since the scientific use of antiseptics has become universal it is far less often seen. In the pre-Listerian days infective ulceration of the rectum was a common complaint at St. Mark's Hospital for Diseases of the Rectum, and was one of the most dreaded after-complications of operations in that institution. One patient would get ulceration of the rectum after an operation for piles, or would come into the hospital with ulceration, and the disease would often spread until almost all the patients in a ward had ulcerative proctitis, and operations could hardly be performed without this dreaded complication occurring. So serious did these epidemics at times become that the hospital had to be temporarily closed, as this was found to be the only way in which it was possible to prevent the cases which came into the hospital for treat-

ment from becoming infected after operations. The infection was doubtless spread by dirty instruments in the operating theatre, and dirty enema nozzles, etc., in the wards.

With the advent of antiseptic surgery ulcerative proctitis ceased to be a common complication after operations upon the rectum, and at the present day is almost non-existent. But there are still some surgeons who think that antiseptic measures are of no use when operating upon the rectum for such conditions as piles and fistula, as they consider it impossible to obtain surgical cleanliness during such operations, and in consequence take none of the ordinary precautions they would when dealing with other parts of the body. As a result of this they sometimes have cases of ulceration following some simple operation. Quite apart from this, however, antiseptic methods occasionally fail even when the utmost care is employed, and a case of ulceration may occur after quite a simple rectal operation. The spreading of such infection from one patient to another is fortunately no longer a possibility in a properly conducted modern hospital.



FIG. 81.—GRANULAR AND ULCERATIVE PROCTITIS AS SEEN WITH THE SIGMOIDOSCOPE

Cases of infective ulceration following some operation upon the rectum are still occasionally met with in hospital practice, and must be attributed to accidental infection of the wounds with pathogenic bacteria. I have seen a few cases where a patient has left the hospital with the wound almost healed and in quite a healthy condition, but has returned in a week or two with well-marked infective ulceration, which has often taken weeks to heal. In such cases the probability is that the wound has become infected after leaving the hospital, another factor no doubt being that in spite of advice to the contrary the patient has returned to work too soon. The ulceration in these cases is usually confined to the last 2 inches of the rectum. On examination this part of the bowel will be found in an acutely ulcerated condition, with a profuse septic discharge and some bleeding. The parts are exceedingly tender, and examination, except under an anæsthetic, is difficult and painful.

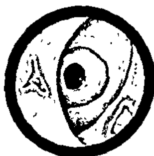


FIG 82.—TRAUMATIC ULCERATION OF THE RECTUM ASSOCIATED WITH STRICTURE DUE TO POISONING WITH POWDERED GLASS (SIGMOIDOSCOPIC.)

Ulceration of the rectum may follow any traumatism of the bowel, and is occasionally seen after child-birth, especially if septic complications in the genital tract have occurred.

As already stated, the actual cause of ulceration of the rectum is nearly always a septic infection, but there are certain constitutional diseases which predispose to ulceration of the rectum, doubtless by lowering the vitality of the tissues and enabling micro-organisms to obtain a hold. Thus chronic Bright's disease may be accompanied by severe ulcerative proctitis. The most serious forms of anæmia also predispose towards this condition. Ulceration of the rectum may be met with, too, in cases of diabetes; it is also by no means uncommon among the inmates of lunatic asylums. In both acute and chronic dysentery severe ulceration of the rectum is found.

Symptoms.—The symptoms are generally those of severe chronic proctitis. Diarrhœa is usually the most prominent symptom, but is chiefly of a spurious character. Most of the patients complain of discharge. Pain varies very considerably; in some cases it is entirely absent, while in others it may be very severe. Much depends on the situation of the ulceration. As a rule, if the sphincter area is involved, there will be severe pain, whereas if the ulceration is higher up in the rectum and does not involve this area, pain may be entirely absent. The discharge is usually of a characteristic salmon pink colour, and sometimes offensive. The patient gets febrile attacks, and occasionally metastatic septic foci are produced in other parts of the body. These may take the form of subacute joint lesions.

Follicular Ulceration of the Rectum.—This is a peculiar form of ulceration in which the ulcers are discrete and vary in size from minute ulcers as big as a pin's head to those the size of a pea. The ulcers are round or oval in shape, and look almost as if they had been punched out (Fig. 83). They are due to the breaking down of the solitary follicles in the mucous membrane. A small abscess forms in the follicle, which at first only opens on the surface by a minute opening. Later the overlying mucous membrane sloughs, and a pit or deep ulcer is left in the situation formerly occupied by the solitary follicle. I have often seen this condition through the electric proctoscope. I have sometimes met with it below a malignant stricture of the bowel, and similarly in cases of simple stricture. The condition does not always produce prominent symptoms. As a rule there is intermittent bleeding and discharge; pain is not usually present. This form of ulceration is said to be the cause of the summer diarrhœa of children, and is met with in a great many conditions. Its exact pathological significance is not yet very well known, but I am inclined to think that, as a rule, it is a secondary form of



FIG 83.—FOLLICULAR ULCERATION OF THE RECTUM AS SEEN THROUGH THE SIGMOIDOSCOPE

ulceration rather than a primary one. It is, however, at present very difficult to be certain whether the more severe types of ulceration do not originate in this condition.

Ulceration accompanying a Stricture of the Rectum.—This type of ulceration is commonly found immediately above a stricture. It never extends below a stricture, and the area of ulceration is generally confined to the dilated portion of the bowel just above the constriction, although in old and neglected cases it may extend for some considerable distance above this. The mucous membrane is often completely destroyed, and abscesses may form in the perirectal tissues, or adhesions may form to other organs where that portion of bowel completely surrounded by peritoneum is involved. This type of ulceration is due to the traumatism produced by retention of fæcal material above the stricture, associated probably with the traumatism which results from efforts to pass this matter through the constriction. A similar type of ulceration is found associated with cases of fæcal impaction in the rectum.

Herpes.

Herpes pustules sometimes form at the edge of the anus just as they do round the lips, and apparently from very similar causes. Thus they are often seen after acute fever, and in some individuals as the occasional result of indigestion. They also occur sometimes as a complication of pregnancy. Owing to the fact that traumatism of the part tends to occur from the constant contact of clothes, there is usually abrasion of the vesicles, and the skin becomes sore and ulcerated. There is a thin serous discharge; the parts become very irritable, and cause the patient a great deal of discomfort. As a rule it is not difficult to recognize the condition, as it bears a close resemblance to the same common type seen on the face. It may in some cases be easily confused with the condylomata of secondary syphilis.

Treatment.—Strong antiseptics should never be applied, as their irritating effect renders the condition worse. The important thing is to protect the parts from friction as much as possible, and for this purpose thin layers of gauze or butter-muslin soaked in some mild alkaline lotion such as glycothymolin (10 per cent.) or lotio rubra are best. The patient should be kept as quiet as possible, so as to avoid friction to the parts; the general hygiene should be attended to; the diet should be made as simple as possible, alcohol and condiments being cut off; and the bowels should be kept acting easily. Later, astringent powders should be applied in order to dry up the parts. These should be zinc and starch powder, aristol, or dermatol.

Eczema of the Anus.

This is a very tiresome and painful condition which is not uncommonly met with in stout people, and also, as a complication, in patients suffering from pruritus ani. It may occur as part of a general eczema, but more generally it is found as an isolated affection. It usually takes the form of what is ordinarily described as a weeping eczema, and there is generally considerable serous discharge. I have often seen it result from the use of unduly strong antiseptics or ointments applied for the relief of pruritus ani. It generally comes on as an acute attack, which lasts about ten days or a fortnight. The appearance of the parts is quite characteristic. There is usually redness of the skin, with superficial abrasion and a slight serous discharge. Crusts form on the surface, especially at the edges, and there is a tendency for the affection to spread over the perineum, buttocks, and inner surfaces of the thighs. The parts become extremely irritable and painful, and the patient is unable to sleep or get any comfort. The condition seems to be much more common in gouty subjects.

Treatment.—When the condition is in the acute stage, treatment should be directed towards the protection of the parts and the improvement of the patient's general health. The bowels and kidneys should be made to act properly by suitable means, and the diet should be regulated, alcohol and spiced foods being forbidden and the nitrogenous diet cut down. If there is insomnia, a sleeping draught must be given each night. Local treatment consists at first in protecting the skin and in allaying the irritation and soreness. All irritating applications should be avoided, and for this reason antiseptics are objectionable. The best application at first is a very dilute lead lotion applied on butter muslin, such as—

℞	Liquor plumbi subacetatis	ʒi
	New milk	℥i

or—

℞	Zinc oxide	grs xx
	Lot plumbi subacetatis	ʒss.
	Glycerine	♏x.
	Aqua rosæ	ad ℥i

As soon as the acute symptoms have subsided the parts should be kept well powdered with calamine powder. Washing should be avoided as far as possible and the patient should lie up.

Ointments are best avoided during the acute stage, as they tend to lock up the secretions and render the parts sodden. They may, however, be used with advantage in the healing stages to protect the new surface of the skin. Bismuth and lanoline ointment, emollientine ointment, zinc oxide made up with lanoline, are all excellent applications in these stages. It is sometimes better to avoid the use of ointments altogether, and to attempt to keep the parts dry by a frequent application of powder.

Syphilis of the Rectum and Anus.

Chancres in the neighbourhood of the anus are, as might be expected, much more frequently found in women than men. While chancres in *this region may* be due to accidental infection, it is a highly improbable cause, and such lesions are almost invariably due to sodomy.

The chancre appears from two to four weeks after infection, and very closely resembles a *posterior fissure. Chancres are generally situated* at the posterior margin of the anal opening, though, of course, they may be found anywhere. Their very close resemblance to an inflamed fissure makes the diagnosis difficult and very easy to miss. They may also be mistaken for epithelioma.

The last three cases of this condition that I have seen all occurred in young men, and the diagnosis was in doubt till secondary symptoms made their appearance. When one has any doubt about the diagnosis, a careful examination of the patient for secondary symptoms should at once be made. The throat and palate should be especially examined, as the earliest symptoms generally occur there, and a Wassermann test should be made of the blood. *But no mention should be made by the surgeon* of his suspicion until it has been confirmed, as the patient and his relatives are certain to seriously resent the suggestion of a syphilitic infection and deny its possibility. The surgeon should, if possible, be in a position to prove his diagnosis beyond doubt before informing the patient.

Condylomata.

The commonest secondary lesions of syphilis found in this region are condylomata, and after the mouth and throat this is the commonest situation for their appearance. They occur as soft, whitish raised papules (see Fig. 84) around the anus, and on the skin near it. There is usually contact infection on the opposite buttock, and as the result of the action of the bowels and scratching the appearances are often very much altered, and even an experienced proctologist may easily be misled into thinking the condition is a simple infection of the skin or a granuloma. There may be considerable swelling and a cauliflower appearance. A correct diagnosis is very important, both from the patient's point of view and from that of the surgeon, who may easily infect himself. This risk is, however, much less in these days, when no surgeon examines the rectum without a rubber glove or finger cot.

Twenty years ago syphilis was a very common disease, but as the result, not probably of improved morals, but of improved treatment, syphilitic lesions are comparatively rare, and surgeons are not so accustomed to seeing them; so that the diagnosis is more often missed than it used to be.

The appearance of condylomata of the anus, which are usually quite characteristic and easily recognized, may be much changed by scratching, friction of the clothing, or the application of poultices, etc. The distribution of the lesions, their acute character, and the nature of the discharge will help to render one suspicious as to the cause, and a careful examination of the patient for other manifestations of secondary syphilis will then usually be sufficient to establish the diagnosis, which can, and of course should be, confirmed by a positive Wassermann reaction on testing the patient's blood.

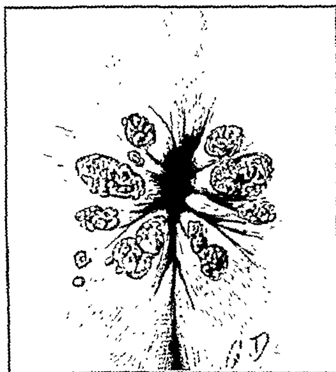


FIG 84.—CONDYLOMA OF THE ANUS.

Secondary syphilitic lesions within the rectum must be very rare. Cases have been recorded of ulcers in the rectum occurring during the secondary stage. Such ulcers are usually just within the rectum, and occur during the early secondary stage, while there are still rashes and enlarged glands. The diagnosis will rest mainly upon the presence of other secondary lesions, and the rapid healing which follows suitable antisyphilitic treatment.

Tertiary Syphilis of the Anus and Rectum.—Gummata may occur in any part of the connective tissue of the body, but so far as my experience goes is rare in the region of the anus and rectum. Gummata are charac-

terized by the presence of an elastic rounded swelling, which is, as a rule, painless, and is unaccompanied by temperature or the usual symptoms of acute inflammation. They do not tend to suppurate, and though they may easily be mistaken for abscesses, may be distinguished from them by the fact that there is no fluctuation and no surrounding acute inflammatory reaction, and also by the fact that they are usually painless. The diagnosis can only be made with any degree of certainty by a microscopical examination of the tissue, and by the fact that the swelling rapidly disappears under antisyphilitic treatment. A positive Wassermann reaction will help to confirm the diagnosis. A positive reaction alone is not, in my opinion, sufficient to establish the diagnosis of gumma.

Tertiary ulceration of the rectum and anus is occasionally seen, but is very uncommon compared with other parts of the body. Cases have been recorded in which most extensive destruction of the perineum has resulted from tertiary syphilitic ulceration.

Fournier described a condition which he called ano-rectal syphiloma, in which there is much thickening and fibrous change in the rectum without the accompanying ulceration. The condition is described as a syphilitic hyperplastic proctitis progressing to the formation of stricture. While quite a number of observers agree in considering this condition described by Fournier as a definite syphilitic lesion, most modern proctologists are unconvinced, and the late Dr. Tuttle, in a very able article in his book on "Diseases of the Rectum" (p. 248), where he gives all the evidence for and against Fournier's view, came to the conclusion that the condition is simply a fibrosis of the rectal tissues resulting from previous ulceration, and not a syphilitic lesion. Yeomans in his book on proctology agrees that tertiary syphilis of the rectum is a quite uncommon disease. This is certainly my own belief, and also, I believe, that of most proctologists at the present day.

The few cases of gummata of the rectum which have come within my observation have been characterized by hard, oval swellings situated under the mucous membrane, and generally multiple, varying in size from that of a small nut up to swellings an inch or more in diameter. They are generally freely movable on the subjacent tissues, and the mucous membrane over them is not ulcerated, but this, of course, depends upon the stage of the disease which has been reached when the patient is examined. Occasionally, however, no doubt as the result of trauma and the passage of hard fæcal material, the surface has become ulcerated, and then a deep craggy ulcer has been produced which closely resembles carcinoma.

There is, I think, a serious risk that occasionally, unless the condition is suspected, a breaking-down gumma in the rectum may be mistaken

for a cancerous growth. As a rule, however, the edges of the ulcer are not so hard in gumma as in carcinoma, and the presence of several separate hard swellings in the neighbourhood should make one suspect the possibility of syphilis. In my opinion the lesion is never single.

The removal of a small portion of the edge of the ulcer for microscopical examination should make certain of the diagnosis, which can be further confirmed by a Wassermann test and by careful examination of the patient for other syphilitic lesions.

The following two cases are typical instances of this condition:

Case.—A gentleman, aged fifty, was brought to me by his doctor supposed to be suffering from a growth in the rectum. He had been suffering from pain when the bowels acted for some weeks, and there had been looseness of the bowels with frequent small stools containing blood and mucus during the same period. On examining the rectum I found a swelling about the size of a walnut high up on the posterior wall, and a bimanual examination showed three other swellings above this and separated entirely from it, while there was also a small, hard lump lower down on the anterior wall. These swellings were evidently in the rectal wall itself and freely movable. A sigmoidoscope examination showed a certain amount of chronic inflammation of the rectum, mostly below the swellings. Careful examination of the patient failed to reveal any other signs of syphilis. He informed us that he had suffered from syphilis some twenty years previously. The Wassermann reaction was "positive," and when put on large doses of potassium iodide, the patient rapidly lost his symptoms and the swellings slowly disappeared.

Case.—A lady, aged seventy-two, was brought to me by her doctor supposed to be suffering from a cancerous growth in the rectum. Just within the rectum, on the posterior wall, was a large indurated ulcer with thick edges which felt like cancer. On the anterior wall, however, there was another swelling about 1 inch in diameter, but with no ulceration over it, and freely movable with subjacent tissues. This case also proved to be one of gumma.

In most textbooks on surgery tertiary syphilis is given as one of the common, often as the most common, cause of simple stricture of the rectum. This was the belief some forty years ago, when it was customary to ascribe to syphilis most of the chronic lesions of the body of uncertain origin. The statement has been copied from one textbook into another, but, nevertheless, it is certainly inaccurate. Syphilitic stricture of the rectum is, at any rate in this country, a very rare disease, according to my own experience and that of my colleagues and predecessors at St. Mark's Hospital. One would suppose that the disease, if common, would be seen at least as frequently at this hospital as anywhere else, but in point of fact there are only two or three cases recorded out of many

thousands of cases of rectal stricture. It must be borne in mind that a stricture is not necessarily syphilitic because it occurs in a syphilitic patient, or because the patient has a positive Wassermann reaction. It is because this fact has not been generally recognized that the mistake is made.

Simple stricture of the rectum is almost always due to chronic ulceration of the rectum, and only very rarely to syphilis, either directly or indirectly.

A number of cases of *syphilitic stricture of the rectum* have been described by American surgeons as occurring among the negro population of America, but the evidence of these strictures being syphilitic in origin has not struck me as very convincing. Stricture is a dirt disease, and one would, therefore, not be surprised to find it associated with syphilis, which in any case is very common among American negroes. Several surgeons who have practised in India and among native races have assured me that they frequently see cases of syphilitic stricture. One of the most convincing arguments in favour of syphilitic stricture among natives comes from Dr. Gray of Nigeria. He describes five cases, four among African natives, and one a European living in the country. In all these cases the stricture was associated with amœbic dysentery, and there was a positive Wassermann. The important point is that in each case the condition entirely cleared up as the result of antisyphilitic treatment combined with injections of emetin, and in three cases colostomy. Complete disappearance of the lesions in these cases is very suggestive that the rectal stricture was, in part at any rate, due to syphilis, although it seems possible that the combination of syphilis and amœbic dysentery was the causal factor.

The following is the only case I have seen of stricture of the rectum due to tertiary syphilis:

Case.—Mrs. B., a woman aged thirty-two, was admitted to St. Mark's Hospital with a stricture of the rectum and a large growth of the anus. On examination there was a mass of granulomatous material covered with skin all round the anus. This mass, which closely resembled an epithelioma and was nearly as hard, was as large as one's fist, and was made up of a number of swellings of different sizes. There was a very tight stricture of the rectum, which would not admit the tip of one's finger. There were no glands in the groin. There was some chronic ulceration in the rectum.

The patient had a history of five miscarriages, and there was a positive Wassermann reaction. The stricture was treated by internal proctotomy, and the patient put upon potassium iodide by mouth and intravenous injections of salvarsan. The condition very rapidly cleared up, the ulceration healing, the dense fibrous tissue softening, and the stricture giving way to regular dilatation.

One must, I think, from the evidence conclude that tertiary syphilis of the rectum and anus is a very rare manifestation of syphilis, and that it is one of the rarest causes of rectal stricture.

The treatment for tertiary syphilis of the rectum does not call for any special mention here; it is simply the ordinary treatment for syphilis by iodides or intravenous arsenical preparations.

The local treatment consists of cleanliness and such treatment as may be necessary to deal with the stricture. On no account should gummata or tertiary ulcers be operated upon. They will entirely disappear under treatment with potassium iodide or salvarsan.

Tubercle of the Rectum and Anus.

Tubercular inflammation of the rectum and anus may take many different forms. It is generally classified as perirectal abscess or fistula, *cutaneous tubercle, tuberculous ulceration, lupus, miliary tubercle,* and it may occur either as a primary or secondary disease; most usually it occurs as secondary to tubercle of the lung, but occasionally is definitely a primary infection. I have seen cases where there has been a tubercular lesion of the anal margin which neither at the time nor later has been accompanied by tubercular disease elsewhere.

Apart from tubercular fistula, which is considered under that heading (see Chapter XI., p. 198), the commonest form of tubercle of the rectum is a chronic ulceration involving both the skin and the mucous membrane. The ulcers are often multiple and start as small, greyish nodules which gradually break down and form undermined ulcers, which spread and invade the surrounding tissues. The appearances of the ulcers are often very characteristic, the edges are irregular and undermined, often to a considerable extent, so that a bluish appearance is given to the surrounding skin. There is little or no induration, the parts are very soft, and there is a thin yellowish serous discharge (see Fig. 86). The ulcers are often extremely painful and very tender to the touch. In bad cases the ulceration is often very extensive and eats into the surrounding tissues and exposes the muscles. Examination of the discharges for tubercle bacilli is seldom any use, although the bacilli can sometimes be found in sections made from pieces of the edge of the ulcer. In course of time extensive fistulæ often occur accompanied by abscesses. The clinical course of the disease varies very considerably, and depends mainly upon the patient's general resistance to the infection. Where there is extensive disease of the lungs the prognosis is bad.



Fig. 85.—Tubercular Ulcer on the Middle Houston Valve. (Sigmoidoscopic)

The condition is sometimes seen in elderly people over fifty years of age, and such cases of senile tubercle are extremely difficult to get to improve. I am doubtful whether a case of senile tubercle of the rectum can be made to heal, although a good deal can be done to ameliorate the symptoms, and the progress of the disease is very slow. In young people, however, a cure can often be obtained, but the disease spreads rapidly unless it can be checked, and is not accompanied by the deposit of fibrous

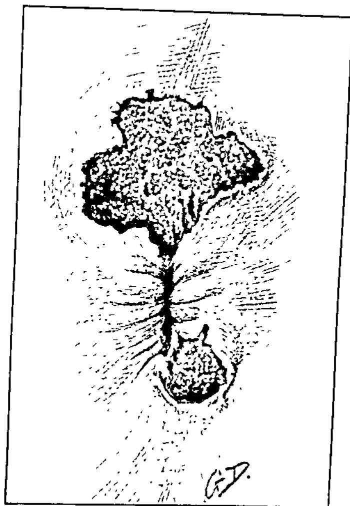


FIG. 86.—TUBERCULAR ULCERATION OF THE ANUS.

tissue. In senile tubercle, however, there is dense thickening and much fibrosis.

There is a rare form of primary tubercle which occurs on the anal margin and closely imitates epithelioma (see Fig. 87). There is a hard greyish granuloma which is not accompanied by ulceration, but by a good deal of thickening. Lupoid ulceration of the anal region is comparatively rare. In the early stages it appears as a small, round, raised

patch with a whitish surface. It tends to break down in the centre, and forms a chronic ulcer with thick edges, and is often extremely painful. It resembles lupus in other parts of the body, but often the appearances are modified by the damp condition of the parts and by friction.

It is often necessary to determine with certainty whether the lesion is tubercular or not, and there are two chief methods of doing so: (1) Microscopic examination of tissue removed from the edge of the lesion, which should be stained with a special stain for tubercle bacilli and very carefully examined; and (2) inoculation of guinea-pigs either with pus from

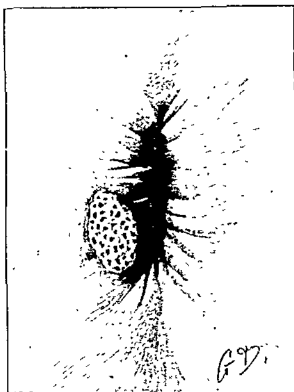


FIG 87—TUBERCULIDE OF ANUS.

the lesion after treatment with antiformin or, better still, with tissue. Examination of the pus itself for tubercle bacilli is useless.

While the commonest form of tubercular ulceration occurs at the anal orifice, ulcers are sometimes found in the mucous membrane higher up the rectum. The ulcers are usually multiple, and no serious difficulty should be found in making a diagnosis from the appearance, which should always be checked if possible by a microscopic examination.

Treatment.—We have to bear in mind, in treating cases of tubercle, that except in a very few instances where the lesion is a primary one we

are dealing with a more or less generalized disease. In the vast majority of cases of tubercle of the rectum or anus the disease is secondary to a pulmonary infection. The success of the treatment in all forms of tubercle will depend very largely upon the patient's natural resistance to the disease, and our main object in the treatment should be to improve the general health as far as possible, so as to raise this resistance. Mere local treatment is not likely to be successful except in the very few cases of primary tuberculosis of the anal margin. Complete destruction of the primary lesion with the diathermy knife will sometimes be successful, but even in such instances the patient's general health must be very carefully studied.

Most cases of tubercular disease are best treated in sanatoria, or at any rate in the country, where they can get good air and be under the best hygienic conditions. Where suitable surgical facilities are not available, the patient should be operated upon in a hospital or nursing home and as soon as possible sent back to the country.

On no account should tubercular ulcers be scraped, as this procedure is very liable to spread the infection to other parts. The lesions should either be cauterized with the actual cautery or, better still, thoroughly destroyed by the diathermy knife. The destruction of the primary lesion is not of much use if the patient has got tubercle elsewhere, and the operative procedure should be confined to opening the abscess or providing suitable drainage. Most of these ulcers heal up better if the undermined edges of the skin are removed so as to prevent accumulation of pus. The dressing should be changed very frequently, and the patient should be given frequent baths; only very mild antiseptics should be used. Everything possible should be done to improve the patient's general condition and to increase his appetite. Some of these cases do very well by exposure to X-rays or ultra-violet light, but this requires to be carried out very carefully to prevent any danger of burning. In a few cases good results have been obtained by treatment with radium.

In cases of senile tubercle a very guarded prognosis should be given, as although some improvement can be obtained, healing of the lesion is unlikely.

CHAPTER X

SIMPLE STRICTURE OF THE RECTUM

STRICTURES of the rectum can be divided into four main groups—congenital, traumatic, spasmodic, and inflammatory.

Congenital Strictures.—These most commonly occur at the point of union of the proctodeum and the hind-gut, which is represented in the adult rectum by the lower edge of the valves of Morgagni, or roughly by the muco-cutaneous junction. The stricture may take any form, from a complete atresia to merely a slight fibrous ring at this spot. In some cases there is simply a general smallness or narrowing of the anus, while in others a membrane, usually composed of skin, covers some portion of the anal opening.

Children born with atresia ani, who have been operated upon during the first few days of life and have survived, are usually the subjects of considerable stricture at the position where the opening was established. Where only a diaphragm has been perforated, there may be little or no narrowing, but where a considerable interval existed between the two portions of gut, a very severe stricture will almost certainly result, and may be most difficult to deal with.

Traumatic Stricture.—Strictures may result from injuries due to penetrating wounds of the rectum, and many such cases were seen after the Great War due to bullet or shell wounds involving the rectum or the neighbouring tissues. They sometimes result from operations upon the rectum, and at one time were quite often seen resulting from Whitehead's operation for piles. They are sometimes seen following the treatment of rectal carcinoma by radium where the growth has been largely displaced by fibrous tissue. Some years ago I saw a very serious stricture which had resulted from the injection of paraffin wax into the perirectal tissues for the cure of a prolapse. There have been several cases of severe stricture due to the accidental injection of boiling enemas or caustic solutions into the rectum. Not long ago I had to attend a lady who had been given a boiling enema by a careless nurse. There was an extensive stricture, but after an internal proctotomy and some months of dilatation she made a complete recovery.

Spasmodic Stricture.—Many authorities have denied that such a thing as a pure spasmodic stricture exists, and have argued that in such cases as have been described the difficulty in the passage of a bougie was due

to its end catching in some fold or angle. Since the introduction of electric proctoscopes, however, this source of error has been easily eliminated, and, further, well-authenticated evidence has recently been forthcoming to show that real spasmodic stricture may occur. Such strictures are not in my experience associated with any irritative lesion in the bowel. They probably result from an abnormality of the sympathetic nerve supply of the bowel.

Inflammatory Stricture.—By far the most important group is that of strictures due to some inflammatory condition involving the rectum and causing a dense deposit of fibrous tissue. These strictures are often called fibrous strictures, but a better name for them is inflammatory.

When a local inflammation of the bowel has been sufficiently severe to cause the deposit of fibrous tissue in the bowel wall, or around it, a stricture may form. Such strictures are the result of the contraction of the fibrous tissue left by inflammation of the part. Unless the inflammation has been severe enough to cause a considerable destruction of tissue, a stricture will not form.

Fibrous strictures of the rectum may result from a great many different causes. A considerable number result from operations upon the rectum in which severe sepsis with destruction of tissue has followed, or where large areas of mucous membrane have been removed. Large fistulæ of the rectum may also result in stricture, especially if they have not been properly looked after during the healing stage. By far the commonest cause of rectal stricture is septic ulceration of the rectum, for any severe form of sepsis or ulceration of the rectum may be followed by stricture. In the pre-antiseptic days septic ulceration of the rectum was not an uncommon result of operations upon the bowel, but now, fortunately, it is very rare. Septic ulceration following operations for piles used to be very common some forty years ago. It was attributed to epidemics and to unhealthy drains, and so on. In fact, part of St. Mark's Hospital was pulled down in the belief that the wards harboured infection. The condition was a severe ulceration of the rectum with profuse discharge of pus lasting for many months, and followed by severe stricture. The real cause of the trouble was the carrying of infection from septic to clean cases by unsterilized enema nozzles and by the surgeon's fingers. At St. Mark's Hospital now each patient has a separate sterilized enema nozzle, and no one is ever allowed to pass a bare finger into the rectum of any patient, new rubber finger cots being used for all examinations. As a result, the old type of ulceration is almost unknown now. I have known it occur after parturition and as a complication of severe illnesses. Parturition I believe to be a not uncommon cause of stricture in women, but this has certainly not received the attention it merits. I have seen quite a number of cases of severe stricture of the rectum in married

women with a history of a very severe and prolonged labour some years previously. The stricture in such cases is always in the same place—namely, about 2 to 2½ inches above the anus. I believe the cause of the stricture in these cases is sloughing of part of the rectal wall from its being nipped between the child's head and the promontory of the sacrum during the prolonged second stage of labour. I have seen stricture from this cause so complete that only a probe could be passed through the opening. It is possible, however, that infection from a dirty enema syringe may account for some of these cases.

There is a very general belief that many of the severe inflammatory strictures are due to gonorrheal infection of the rectum. This was the conclusion of my colleague at St. Mark's, Lionel Norbury, and Yeomans gives a similar opinion in his book. I have seen a number of cases of old chronic fibrous stricture of the rectum, but have never been able to prove any definite causal factor beyond chronic sepsis. There is always a history of prolonged suppuration in these cases, and it seems that any form of infection which results in ulceration of the rectal mucosa for a long period, especially if combined with neglect in the way of treatment, is liable to cause a severe fibrous stricture. Gonorrhœal infection no doubt is sometimes the cause of the initial lesion, but secondary infection probably supervenes to maintain the condition. Though these strictures are still seen, they are not as common as they used to be. The London museums have a very large collection of specimens of rectal stricture which would be very difficult to collect to-day. No doubt better and earlier treatment has much to do with this.

These strictures used to be considered syphilitic, but while syphilitic stricture certainly occurs, it is very rare in this country.

Inflammatory stricture is much commoner in women than in men, probably due to the greater liability for infection to spread to the rectum from the genital organs, and to the fact that child-birth in women renders them liable to pelvic inflammation.

Syphilitic Stricture.—Syphilitic stricture is very rare in England, and only a very few undoubted cases have been recorded. The fact that a patient with stricture of the rectum has a positive Wassermann or other sign of syphilitic infection is no proof that this is the cause of the stricture. On the other hand, if the condition clears up on antisyphilitic treatment the presumption is strong that syphilis is the causal factor. In other parts of the world syphilitic stricture appears to be much commoner than in this country. Dr. Gray of Nigeria (see p. 174) has recorded five cases of stricture which appeared to have resulted from syphilis and amœbic dysentery combined. Dr. Curtis Rosser, who has had an extensive experience of the American negro, finds rectal stricture very common among these people, and believes that negroes have a special racial

tendency to the formation of fibrous tissue as the result of inflammation, which he calls a "fibroplastic diathesis." He points out that keloid formation is extremely common in negroes and fibrous tumours generally. While luetic infection is common, it only seems to account for a small percentage of the observed strictures.

Dysentery.—It seems probable that dysentery does not cause stricture of itself. There is ample proof that the very severe and extensive ulceration seen in the bowel in cases of amœbic dysentery may be entirely cured without any stricture resulting. One would suppose that, if dysentery gave rise to stricture, it would be a common cause of it, but as a matter of fact this is not the case.

We know that dysentery is a term applied very loosely to any case of diarrhœa occurring in a tropical climate. I know of one case in which a patient, supposed for months to be suffering from dysentery, was found on examination to have half an egg-cup impacted in his rectum. In another case the patient had been poisoned with powdered glass. It seems probable that in those cases in which a stricture appears to have resulted from dysentery, the original ulceration was septic and not dysenteric; also many cases of true amœbic dysentery subsequently develop chronic ulceration of the septic type, and may then get a stricture in the course of time. Such strictures are not properly attributable to dysentery. It may, I think, be definitely stated that true amœbic dysentery does not produce stricture unless a secondary infection takes place.

Bilharzia Hæmatoba.—Strictures due to bilharzial infection are quite common in Egypt. Some of these strictures are very serious, and are accompanied by a great deal of dense granulomatous tissue around the anal margin. Secondary carcinomatous change in cases of old standing is not uncommon. For this reason complete excision of the rectum is often indicated. The modern treatment of bilharzia, which is usually successful in killing the parasite, will certainly result in such strictures becoming much less common.

Pathology.—Most of the writing on the pathology of rectal stricture appears to have centred round the question of whether or not it is syphilitic, and to a large extent without any definite conclusion having been come to.

As regards the histological character of the stricture itself, it is a noticeable feature of these rectal strictures that there is never any ulceration of the actual lining membrane of the stricture; the ulceration, if present, is always above or below the stricture, and often both. Cross-sections through the stricture demonstrate the fact that the ordinary cylindrical type of epithelium has been replaced by a pavement epithelium. This can be noticed clinically by observing that in the stricture itself the epithelium has lost its normal glistening appearance.

In strictures of very old standing there is a tendency to the formation of curious polypi immediately above the stricture. These polypi may become very numerous, and by constant traction elongated until they may have a length of as much as 2 inches, and even more. There is a very remarkable specimen in the museum of St. Bartholomew's Hospital of an old stricture of the bowel, with a great number of long, thin, oddly shaped polypi, many of which reach to as much as 2½ inches below the stricture, their pedicles, however, arising from immediately above it. It is difficult to account exactly for the presence of these polypi, but they appear only to arise in strictures which have existed for a considerable time.

The deeper layers of the stricture show typical fibrous tissue involving some or all of the coats of the bowel, according to the degree of involvement of these parts by the original inflammation.

Ulceration.—One of the first complications that occurs when a stricture begins to cause obstruction is ulceration of the mucous membrane immediately above it. This is the characteristic stercoral ulceration, and is undoubtedly due to the presence of long-retained fæcal masses. It may extend for any distance up to several inches from the stricture, and occasionally cases have been reported in which there were ulcers in the cæcum. The serious consequences which may follow rectal stricture are attributable more or less directly to the presence of these ulcers.

Ulceration also occurs in many cases below the stricture, but this is always confined to an area just below, and is due to an entirely different cause, probably to interference with the blood-supply by the fibrous tissue causing a stricture.

Perforation of the bowel may result from an old stricture, and when it does the perforation is generally found to be through the base of one of the ulcers, in a few cases the cæcum has perforated as the result of a tight rectal stricture.

A common complication of rectal strictures of old standing is the formation of fistulæ opening on the skin around the anus. As a rule, however, it is only in the very late stages of stricture that this occurs. These fistulæ may be numerous, and invariably it will be found that the internal opening of these fistulæ is below the stricture. Fistulæ into other organs, such as the bladder, vagina, and urethra, are also met with.

Diagnosis.—The diagnosis of rectal strictures is, as a rule, not difficult, once their presence has been suspected. By far the best way of examining them is with the finger. In the case, however, of very high strictures, which cannot be reached easily or at all, the use of a short electric proctoscope tube is often of great value. It should be of large enough calibre to enable bougies to be passed through it with the object of investigating the stricture. Soft rubber bougies of the Wales type, with a probe-shaped

point, are by far the best for this purpose; but another very useful instrument is a thin flexible wire with a bulbous end of sufficient diameter just to pass the stricture. With this the limits of the stricture can be determined fairly accurately, even though it is impossible to reach the stricture with one's finger.

Usually it is possible, with care, to pass a very small diameter sigmoidoscope through the stricture and thus examine the condition of the bowel immediately above, and to ascertain whether ulceration is present, and, if so, to what extent.

It will often be necessary to give the patient an anæsthetic for this purpose. Needless to say, the greatest care must be practised in investigating a stricture for the first time, as it is impossible to know beforehand how thin the bowel may be, and any roughness may easily result in a perforation.

Where tubercle or malignant disease is suspected, a small piece, if a suitable area can be found, should be nipped off with Brüning's forceps for microscopic examination. It is quite useless to test the pus from ulceration above the stricture for tubercle bacilli, as they will almost certainly not be found. Histological examination of the tissue removed is alone of any value. An X-ray examination will often prove of value in helping to determine the limits of the damaged bowel.

Symptoms.—As a rule stricture of the rectum does not cause sufficient symptoms to attract the patient's attention until the narrowing of the lumen is very considerable; but for a long time before this it will be easy to demonstrate the presence of a latent stricture if the patient is examined. It is only when the stricture begins to cause definite obstruction to the passage of fæces that well-marked symptoms make their appearance. In some cases there is simply increasing difficulty in getting the bowels to act, this being only accomplished at long intervals and at the expenditure of much time and trouble. More frequently diarrhœa is a prominent symptom. There may be alternating periods of diarrhœa and severe constipation, or both conditions may exist at the same time—that is to say, the bowels may be acting slightly several times a day, but the quantity got rid of may be quite inadequate to relieve the bowels. A very common condition is that in which there is a constant dribbling of small quantities of mucus and liquid; but the patient feels no relief, and is always straining and uncomfortable. The diarrhœa that results from stricture is spurious and most misleading unless its true cause is recognized.

Complete obstruction never results from stricture alone, as the lumen is never entirely obliterated, but from the impaction of hard masses of fæcal material above the stricture.

Sooner or later in all cases of stricture ulceration of the bowel above

the stricture will occur from the presence of retained fæcal masses. The result of this secondary ulceration is to increase considerably the severity of the symptoms. Diarrhœa, if not previously present, now becomes a marked feature of the case, and there is much discharge of blood and pus.

Much importance is often attributed to the shape of the dejecta as a symptom of stricture. Any soft mass, however, must take its shape from the last orifice through which it has passed, and this must always be the anus. Unless, therefore, the stricture is actually at the anal orifice, the shape of the dejecta can be of no possible significance, and in the latter event the most superficial examination of the patient can hardly fail to reveal the presence of the stricture.

A great deal may be done to prevent the formation of stricture of the rectum by careful treatment of ulcerative lesions in the rectum and anus. Strictures usually result from untreated cases, and are comparatively rare where proper treatment has been instituted. The patient should be carefully watched for some months, even after the ulceration has healed, and on the slightest sign of contraction of the parts regular dilatation should be instituted. Very few serious strictures of the rectum would occur if proper care were taken in this respect.

Palliative Treatment—*Dilatation*.—This consists in dilating the stricture and, by means of antiseptic injections, healing up any ulceration which exists.

The very greatest care must always be taken in dilating a rectal stricture, for there have been a considerable number of serious accidents from this cause. I have met with four cases where a fatal result followed attempts to dilate a rectal stricture; in two cases the patient himself was responsible for the accident, and in the other two cases the accident resulted from attempts by medical men to dilate a difficult stricture. All four cases ended fatally. The danger lies in splitting the stricture, and so allowing septic material to reach the cellular tissue outside the bowel, and lead to the formation of abscess or septicæmia. The greatest danger is connected with strictures which involve that portion of the rectum above the peritoneal reflection, as the bowel wall is very thin here, and, if it is split, general peritonitis will almost certainly result. As a general rule, with the exception of strictures at the anal orifice, the dilatation of strictures of the rectum should not be attempted by anyone who has not had previous experience in the use of dilators.

There are a great number of rectal dilators, but no form of mechanical dilator should under any circumstances be used; they are very dangerous instruments, and they have no advantage over graduated bougies, while they have many serious disadvantages. I know there are still some surgeons who use them successfully and safely, but I am convinced that

if they were to try the graduated bougies they would never return to mechanical dilators.

The two best patterns of dilator now in use are the flexible Wales bougies and the graduated rectal metal dilators. Where the stricture to be dilated is situated high up in the bowel, the Wales bougie should alone be used. This is also the best instrument for anyone unaccustomed to the use of bougies, and when the patient wishes to use a bougie himself in order to keep the stricture dilated. The Wales bougie is made of soft red rubber, and has a small channel through the centre. The best pattern has a probe point. Several sizes should be at hand.

Method of dilating a High-Lying Stricture in the Rectum.—The patient should be on the left side with the knees drawn up. A Wales bougie of suitable size should be warmed in hot water and thoroughly greased all over with a liberal supply of vaseline. It should then be passed in until the probe end is felt to pass into the stricture. If necessary, a finger should be passed alongside the bougie to make certain that it is in the right place; then the bougie should be pressed in very slowly, only very moderate force being used. Considerable patience is often necessary, and on no account should the operator be tempted to use much force, as there is great danger in so doing. When the bougie is felt to slip through the stricture, it should be left in for a few minutes, then withdrawn, and the next size larger passed in. It is not advisable to attempt to dilate the stricture much at one sitting. It is better, after having used bougies of two or three sizes, to postpone further dilatation till next day, and then to start again with the smallest size. In the case of very obstinate strictures, it is often advisable to leave the bougies in for some hours, giving the patient a sedative, such as a morphia injection, to allay the pain.

The great advantage of using soft rubber bougies for high-lying strictures is that, should the point of the bougie catch in some fold in the bowel, it will turn to one side or double upon itself, whereas if a stiff bougie were used, it might perforate the bowel wall.

It cannot be insisted on too strongly that the dilatation of strictures high up in the rectum is a dangerous operation, which must be carried out with the greatest care and patience. I know of several cases where fatal results have followed the dilatation of such strictures by surgeons. The sigmoidoscope will often prove a valuable aid in directing the point of the bougie into the stricture.

When the stricture is low down in the bowel—that is to say, within $2\frac{1}{2}$ inches of the anus—metal dilators may be used. These are much better than rubber or gum elastic bougies, as they are both cleaner and smoother; they should be made, like uterine dilators, with parallel sides and with all the taper in the last inch. There should not be more than $\frac{1}{16}$ inch difference in diameter between the different sizes.

The largest size that will pass is first introduced, and left in for about half a minute; then the next size is introduced, and so on.

As stretching the stricture is a very painful process, it is generally advisable to administer an anæsthetic, or to give an injection of morphia half an hour beforehand. On no account should the stretching process be continued to such an extent as to split the stricture, or a perirectal abscess will result. Once the stricture has been dilated, the patient should be given a dilator of suitable size, and instructed how to pass it for himself. It should be passed daily at first, and then at increasing intervals, until there is no longer any tendency to recontraction.

If there is any ulceration of the bowel associated with the stricture, this should be treated by antiseptic or astringent injections until healed.

Operative Treatment.—The following methods have been used, and the choice of any particular one must depend very largely upon the type of stricture which is found to be present:

1. Internal proctotomy.
2. Complete proctotomy.
3. Excision of the stricture or of the rectum.
4. Colostomy.

1. *Internal Proctotomy.* — The operation corresponds to internal urethrotomy.

The stricture is divided in two or three places with a sharp knife, and then dilated up to its full capacity. This is followed by the introduction of a vulcanite tube of large calibre to keep the parts stretched during the healing process. In the past this operation has been much condemned, and, in fact, had been almost given up owing to the fact that there were cases in which serious complications resulted. This was also the case with internal urethrotomy twenty years ago. If performed in the proper way, however, and correct antiseptic precautions taken, the operation should now be considered safe, and is, in fact, by far the best method of treating strictures of the rectum. It need hardly be pointed out that it is quite an unsuitable operation to perform on any stricture which is above the peritoneal reflection.

It is a good operation for any strictures of the diaphragm type, and can also be used in some cases of stricture of the tunnel type, providing that the total length of the stricture is not more than $\frac{3}{4}$ inch. I have used this operation repeatedly during the last fifteen years, and have never had a single accident or any complication. No one should attempt it, however, who is not confident of preventing secondary infection.

The immediate results are excellent, healing is generally complete in from eight to ten days, and the patient gets complete relief from symp-

fæces, to enable the stricture to be kept washed out, and to allow ulceration to heal. This is a very excellent procedure in suitable cases, especially when there is a large amount of ulceration associated with the stricture. After the parts have been thoroughly healed up by frequent irrigation, the stricture can very often be dilated, and when a suitable calibre has once been re-established, the colostomy can be closed. It is often astonishing how much improvement can in this way be obtained in cases of bad stricture.

(2) A permanent colostomy may be established. Although patients naturally object to the establishment of an artificial anus, they are infinitely more comfortable afterwards than they could possibly be with a tight and non-dilatable rectal stricture. Moreover, it does away with the risk of severe ulceration and perforation, which in the case of a bad stricture is by no means inconsiderable.

In all bad cases of tunnel and tubular strictures involving the whole of the rectum, a colostomy should be established in the pelvic colon above it. It will seldom be possible to close this at any later period, but should it prove so there is no great difficulty in getting rid of the colostomy.

In my opinion, the best treatment for strictures of the rectum is in the very mild cases gradual dilatation, in the more severe cases proctotomy, and in the bad cases the establishment of a permanent colostomy.

CHAPTER XI

FISTULA

The operation for "fistula-in-ano" is associated with the very earliest records of surgical literature. In fact, it would seem that, apart from the operation of trephining, which can be traced back to the Stone Age, operations for the cure of fistula were among the earliest to be performed for the relief of suffering humanity.

In the days of early civilization, when cleanliness was a matter of secondary consideration—water being used chiefly for drinking purposes—and the horse was the only means of transport, fistula must have been even a more serious inconvenience than it is now.

In the Code of Hammurabi (about 2200 B.C.) there is a reference apparently to the treatment of this condition, and among the instruments unearthed at Pompeii are several for the performance of operations for fistula, showing that the treatment by operation was known in the first century A.D.

One of the very earliest descriptions of the treatment of fistula is a fifteenth-century manuscript by John Arderne, who practised surgery in the fourteenth century and wrote his treatise in the year when the Black Prince died. Arderne undoubtedly understood the main principles necessary for the cure of a fistula, and as an operator was far ahead of his time. He preferred to divide completely the main track of the fistula in one clean cut with a knife and to leave the wound to granulate without applying caustics, hitherto the invariable practice.

By a fistula we generally understand a granulating track opening into the rectum or on to the skin surface. As the term is applied in rectal surgery, a fistula means an abscess opening either into the rectum or anal canal, or on to the surface of the skin in the immediate neighbourhood of the anus.

Fistulæ are, of course, common enough in other portions of the body besides the anus and its immediate neighbourhood; but for certain reasons, which are worthy of careful consideration, that particular part of the human body associated with the termination of the alimentary canal is very liable to the occurrence of fistulæ.

There is a large amount of loose cellular tissue surrounding the anal canal and lower portion of the rectum, and filling up the spaces called the "ischio-rectal fossæ." The object of this large amount of cellular

tissue is to allow of the variations in the calibre of the rectum which are necessary for the expulsion of the solid excreta, and also to allow it and the other pelvic organs free movement. This cellular tissue, like, indeed, all cellular tissue, has a somewhat low vitality as compared with other tissues; but it is not so much this fact as the almost complete absence of any natural boundary to the spread of the products of inflammation, which the cellular tissue affords, that makes it so easy for abscesses to spread in this region. The ischio-rectal fossæ are peculiar in that the deep fascia, instead of lying beneath the skin, is reflected over the deep surface of the fossæ in this situation; consequently, when an abscess forms in the cellular tissue beneath the skin and begins to exert pressure, it can spread readily and reach quite a large size before any external evidence of abscess makes its appearance.

At St. Mark's Hospital we possess the best facilities for judging of the frequency of different forms of rectal disease, owing to the very large numbers treated there. Allingham from this source found 1,057 cases of fistula out of a total of 4,000 cases treated in the hospital. Between the years 1909 and 1911 there were 503 cases of fistula out of a total of 1,800 cases treated. Between 1927 and 1929 there were 301 cases of fistula out of a total of 2,209 cases.

It is thus obvious that the proportion of fistula cases to the total cases admitted has steadily diminished. It would seem that this must be due to an actual decrease in the number of fistula cases. It certainly cannot be due to the increased operating facilities elsewhere, as the number of pile cases treated during the same period has increased. Greater cleanliness and more prompt and better medical treatment in the early stages probably account for the improvement.

Etiology of Fistula-in-Ano.—The primary cause in all cases is an abscess in the tissues surrounding the rectum. The abscess either bursts into the bowel, on to the skin, or in both directions, and in this way a fistula is produced. Fistulæ are often classified as complete, blind internal or blind external, but such a classification is of no value or importance. Our chief concern is with the cause of the abscess. These causes may be classified as follows: (1) Congenital cysts, (2) foreign bodies, (3) fissures and ulcers, (4) suppuration in the intramuscular glands, (5) injury, (6) tubercle.

Congenital Cysts are described on p. 265.

Intramuscular Glands.—These glands have until quite recently been overlooked by anatomists. They are found near the lower part of the anal canal as tubular, branched structures of glandular origin. They pass into or through the muscular coat of the bowel and end blindly in the connective tissue. In some cases they can be seen to pass through the circular muscle coat (generally called the internal sphincter) and to

FIG. 89.—TRANSVERSE SECTION OF ANAL CANAL, SHOWING INTRAMUSCULAR GLANDS (D AND D.)

A, Epithelium; B, sphincter, C, tendon of longitudinal muscle.

terminate in the apex of the ischio-rectal fossa. Careful microscopical sections will demonstrate the presence of several such glands in most rectums. They are very erratic in number and distribution, and seem to serve no particular purpose. It seems probable that they are the remains of smell glands, which fulfilled an important function, as smell was the chief sex attraction before our ancestors assumed the erect posture. Figs. 89 and 90 show several of these glands in the connective tissue outside the muscular coat. These glands, communicating as they do with the bowel lumen, afford a path for

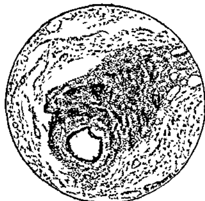


FIG 90.—SHOWS AN INTRAMUSCULAR GLAND HIGHLY MAGNIFIED, WITH SMALL CELLED INFILTRATION.

infective organisms to reach the connective tissue of the ischio-rectal fossæ and so set up an abscess in this region.

Foreign Bodies.—It is obvious that any sharp foreign body which has been swallowed may, when it reaches the narrow exit of the anus, perforate the bowel wall and so infect the perirectal connective tissue. While this is an undoubted cause of fistula, it is probably not a common one. At St. Mark's Hospital there is a collection of such foreign bodies which have been found inside fistulæ. They mostly consist of fish-bones or spines, pieces of wooden skewers, and sharp portions of bones, generally bird bones.

Fissures and Ulcers.—A neglected fissure, by penetrating the rectal wall, not uncommonly results in the formation of a fistula, a direct communication being established between the base of the fissure and an

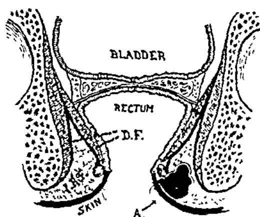


Fig. 91.

I R F, Ischio-rectal fossa; D F., deep fascia; A, abscess spreading in fossa without causing swelling on skin. Note that the deep fascia does not in this situation compel the abscess to extend towards the skin until the whole ischio-rectal fossa is filled.

opening some way distant on the perineal skin. Such fistulæ are usually fairly simple and of small dimensions. When an ulcer higher up in the rectum penetrates the rectal wall a much more serious type of fistula results.

The usual life-history of a fistula is as follows: As the result of straining, or of the passage of some hard substance, a small tear or wound is produced in the mucous membrane of the anus at the point of greatest resistance—namely, the "white line," or upper level of the external sphincter. This small wound becomes infected with pathogenic micro-organisms, which are always in the vicinity, and the submucous layer of the bowel wall is infected. This is the beginning of the formation of an abscess in the perirectal tissues. The abscess readily spreads in the loose cellular tissue which is particularly abundant in this area, and an abscess of considerable dimensions is rapidly formed (see Fig. 91).

After a time the abscess bursts either into the bowel or through the skin, or both. The contents of the abscess being expelled, healing rapidly occurs in the main abscess, but the communication between the skin and the bowel in the great majority of cases persists as a fistula.

I think everyone in these days will agree that the only treatment for an abscess in any position is to open it immediately and drain it. In practice, however, abscesses in the neighbourhood of the anus are seldom treated upon these lines. There are several reasons for this. The most important is the fact that an abscess in the cellular tissue around the anus does not in the early stages cause the ordinary signs associated with abscesses in other parts. The abscess generally commences either immediately below the mucous membrane or immediately beneath the skin, but as there is no deep fascia to limit it, it does not cause external swelling until it has reached a considerable size. The skin around the anus is thick and tough, so that the abscess tends to spread in the loose cellular tissue rather than towards the skin. The ordinary signs of abscess, such as redness, swelling, and heat, will not be obvious until the abscess is comparatively large. The only early signs of abscess in this situation are pain and local tenderness, often accompanied by a certain amount of malaise and a heightened temperature. This is the stage at which the abscess should be opened, and at which, if it is opened, a subsequent fistula can often be prevented. At this stage in the formation of the abscess no swelling will be obvious, and there will be little if any redness of the overlying skin. If, however, when these symptoms are complained of, a finger be passed gently into the anus and the parts carefully palpated between the finger and thumb, induration will be felt, accompanied by marked tenderness on pressure. These signs are quite sufficient to warrant an incision, and the proper treatment is to administer an anæsthetic without delay, and under proper aseptic precautions to introduce a knife through the skin some little distance away from the edge of the anus, and to incise the indurated area.

It often happens that an incision at this stage will show very little more than a slight discharge of sero-pus, but this does not mean that the incision was unnecessary. If such treatment is carried out promptly and thoroughly, the abscess will almost certainly subside, like any other abscess, and without the subsequent formation of a fistula. The common mistake that is made in such cases is to temporize for a few days and to treat the case with fomentations in the hope that the abscess will subside or will become sufficiently obvious to be easily opened. The fact that this treatment gives considerable relief to the patient apparently justifies its adoption. What occurs is that in the course of a few days the abscess begins to point or bursts, there is complete cessation of pain, and everybody is satisfied that the correct treatment has been adopted. The

result of such treatment, however, will be almost inevitably the formation of a fistula-in-ano, and a subsequent operation for its relief.

Tubercle.—A tuberculous fistula is an ordinary fistula in which the predominating infective organism is the tubercle bacillus. Tubercle can hardly be called a cause of fistula, the tuberculous fistula being really only a special form of fistula, which differs from the more ordinary kind owing to the nature of the infective agent. It used to be taught that most fistulæ are tubercular in origin, but this is very far from being the case. At St. Mark's Hospital we have unequalled opportunities of studying the condition, and the statistics clearly show that the proportion of tubercular fistula is between 15 and 20 per cent. In considering this statement, however, it must be remembered that fistula in tubercular subjects is common; but this is, of course, quite a different thing from most fistulæ being tubercular. The probable reason why nearly all fistulæ used to be considered tubercular was that fistulæ were found to be very difficult to heal, and the surgeon, in attempting to find a reason for his failure, concluded that it was because the lesion was tubercular. Further belief was lent to this view by the fact that fistulæ which are tubercular are very difficult to heal, no matter how skilfully they are operated upon. As a rule there is no difficulty in distinguishing a tubercular fistula from one of the more usual type, and it is quite wrong to assume that because a fistula is difficult to heal it must therefore be tubercular. If tubercle were the commonest cause of fistula, we should expect to find tubercular ulceration of the rectum or anus accompanying it. This, however, is not the case, and, moreover, we find that very few patients with fistula have any signs of tubercle.

It is not an easy matter to obtain accurate statistics, even at a hospital like St. Mark's, as to the proportion of tubercular fistulæ to the total number of cases. Microscopic examination of the discharge and scrapings from the fistula are quite unreliable.

My colleague Gabriel at St. Mark's Hospital made a very careful investigation into this subject. He investigated seventy-five consecutive cases of fistula by two methods:

1. *Histological Examination.*—Portions of the wall of the fistulæ were stained by a modified Ziehl-Neelsen method and searched for tubercle bacilli.

2. *By inoculation* into guinea-pigs of material obtained from the fistulæ. This method is carried out as follows: A portion or scraping from the fistula is placed in a sterile receiver, cut up in small pieces, and treated with antiformin. This destroys all pyogenic organisms, but leaves the tubercle bacillus intact, provided it is not exposed to its action for more than three hours. The material is then washed with sterile salt solution. The solution is centrifuged and the residue injected into the abdominal

wall of a guinea-pig. The guinea-pig is kept alive for six weeks, and then killed and examined for caseous nodules. This, while rather an elaborate method, has the advantage of considerable accuracy, and the conclusions arrived at were that 20 per cent. of the fistulæ examined were tuberculous.

These, I think, are the most accurate investigations on this subject which have yet been made, and they show us that the proportion of fistulæ which are tubercular is some 4 or 5 per cent. higher than the figure we had arrived at by purely clinical observation. It may be taken as certain that examination of the pus for tubercle bacilli is a quite unreliable and useless method. With regard to the proportion of tubercular patients who develop fistula, the records of the Brompton Hospital for Consumption show that 4 per cent. of the cases admitted to that institution are suffering from fistula.

Tubercular fistulæ may be primary—that is to say, there may be no other discoverable tubercular lesion in the patient. This statement has been disputed by many, but I have no doubt such primary tubercular fistulæ do occur, and I have myself seen cases in which there seemed to be no doubt of the fistula being the primary lesion. Probably the primary tubercular infection occurs in consequence of the organisms getting through from the gut owing to some abrasion; it is unlikely that it occurs from the outside. It is found by bacteriological examination that the tubercle bacillus is present in normal fæces. Of course, the reason why more people do not suffer from tubercle is that they are able to resist it, not because they do not get the bacillus into their body. A tuberculous fistula has no fibrous wall, but shows the granulation tissue infiltrating all the surrounding structures, and without any limiting membrane.

Fistula is usually a disease of adult life. It may, however, occur at any age, and cases are not uncommonly met with in quite young children. I have met with one case in a child aged four months.

Case.—A boy, aged four months, had a history of discharge in the anal region for six weeks. He also had a double otorrhœa. On examination there was the external opening of a fistula just in front of and to the left side of the anus, and from this a track passed across in front of the bowel, and had an opening situated anteriorly. It healed rapidly after being operated upon.

Fistula is commoner in males than in females, but no very satisfactory explanation of this fact has been put forward. That there is probably greater liability of males to injury may have something to do with it. The following table of cases of fistula in St. Mark's Hospital for five years shows:

Year.	Males.	Females.
1928	72	36
1929	78	29
1930	124	39
1931	81	30
1932	150	42

Simple Fistula.—The simplest form of fistula is one having an internal opening just within the anus posteriorly and an external opening on the skin behind the anus, with a straight track connecting the two. A fistula of this type not infrequently results from a neglected fissure. Such fistulæ do not pass deep to the external sphincter, and laying open the fistula will not involve division of the sphincters. This form of fistula is shown in Figs. 92 and 93, A.

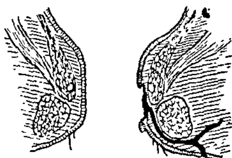


Fig. 92.—Diagram showing how a Fissure may give rise to a Fistula.

Fistulæ with Multiple Openings.—However many external openings there may be on the skin, it is very exceptional to find more than one internal opening, and the late Mr. Goodsall was the first to point out that the internal opening and the external ones usually bear a definite relation to each other. He maintained *that all fistulæ with their external openings behind a line drawn transversely through the anus have their internal opening in the middle line behind, while those fistulæ whose external openings are in front of such a line have the internal opening opposite to the external one.* This is often a very useful rule to bear in mind, and will be found of much help in defining the exact formation of a fistula; but there are, of course, numerous exceptions to the rule, and it must not be depended upon too implicitly. In fistulæ of old standing there are often a number of external openings, five or six being not uncommon. Some of the external openings may be at a considerable distance from the anus, and the tracks may be very tortuous and complicated. In the majority of cases they will be found to communicate at some point behind the anus, and from this communication a track will be found passing into the bowel posteriorly. To show how far the tracks of a fistula may sometimes extend, a man was under my care a few years

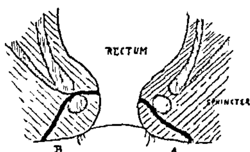


Fig 93.—Diagram of Rectum, showing: A, Usual Relationship of a Fistula to the Internal Sphincter; and B, Less Usual, but commonly described Relationship.

ago with a fistula opening into the bowel which extended down the left thigh under the fascia lata and opened in the popliteal space. The same patient had another track which opened on the left side above the iliac crest.

Horseshoe Fistulæ.—A very common form of complicated fistula is what is usually called a "horseshoe fistula." The internal opening is generally situated in the midline posteriorly, and there is a track passing forward on each side of the anus to external openings at the sides. From the point of view of treatment, it is most important to know exactly how the track of a fistula passes from the internal to the external opening, as most of the failures to heal a fistula are due to some track, or part of one, being missed. Anterior horseshoe fistulæ are also met with, but are not so common as the posterior variety. Fistulæ completely surrounding the anus are occasionally met with, and are usually associated with a posterior internal opening.

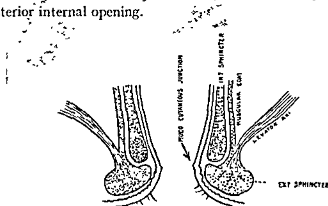


FIG. 94.—DIAGRAM TO SHOW ARRANGEMENT OF THE MUSCLES SURROUNDING THE ANAL CANAL.

There are some points in connection with the anatomical relationship of a fistula which are most important from the point of view of treatment (Fig. 94). It is frequently taught that the commonest arrangement of a fistula is that in which the external and internal openings communicate by a track which passes between the two sphincters, as in the diagram (Fig. 93, B), and this is the arrangement usually shown in the illustrations in books on the subject. This is not, however, the commonest arrangement, and it is fortunate that it is not so. The internal opening is usually situated posteriorly at the muco-cutaneous junction, but the track, as a rule, does not pass deep to the external sphincter, but superficial to it (Fig. 93, A).

It is quite obvious that, if the fistula passed deep to the external sphincter, the latter would be divided in laying open the fistula. I have made careful observations of the parts cut in a great many cases when operating for fistula, and have found that it is quite the exception to

find any of the fibres of the sphincter to have been cut. If, when operating for fistula, one divides the track to the internal opening by cutting down on to the director with an ordinary scalpel, instead of, as is more usual, transfixing it, it is quite easy to observe whether or not one cuts the fibres of the external sphincter. This has been my practice for a number of years now, and I have been surprised to find in how few cases the muscle has been cut.

It has for long been supposed, if we may judge from textbooks of surgery, that division of the external sphincter is necessary to obtain healing, and some writers have even stated that the external sphincter

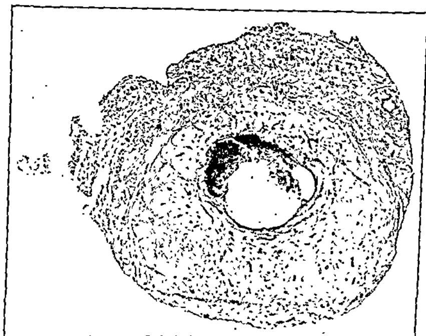


FIG 95.—ANO-RECTAL FISTULA.

Low-power view of cross-section of a fistula infected with pyogenic bacteria. Such a fistulous track is normally almost completely filled with granulation tissue, and the hollow appearance in this section is unnatural, being due to the passage of an instrument (× 10)

must be divided in order to give rest to the parts. The belief that the track of the fistula usually passes between the external and internal sphincter muscles is a common one; but I am persuaded, from careful observation over a number of years, that such is not the case. While undoubtedly the track does pass between the sphincters in some cases, in the majority of cases it passes superficial to the external sphincter. After all, this is what one would expect. The inflammation which has caused the fistula tends to spread by the path of least resistance, which is along the subcutaneous cellular layer. There is no reason why a fistula should pass between the two muscles, which are firmly connected together, rather than by the loose tissue overlying the external sphincter.

An investigation of a number of cases of fistula made by Morgan showed that 51 per cent. of fistulous tracks passed superficial to the external sphincter, 33 per cent. passed deep to the sphincter, and 15 per cent. passed through the muscle.

The ordinary fistula shows a definite histological appearance: it is a fibrous tube filled with granulation tissue and pus. Such a track in cross-section is shown in Fig. 95, and when we see this section we are no longer surprised that such tracks will not heal without surgical interference. It also demonstrates the desirability, when possible, of removing the fibrous track, which must seriously interfere with the healing of the wound.

A fistula is often much more extensive than it appears to be from an examination of the outside skin; there are frequently tracks of considerable length running in different directions up and around the bowel. It is always advisable to bear in mind that, with very few exceptions, the internal opening of the fistula is situated low down and within ¾ inch of the skin margin. The fact that a track can be detected running up the bowel for some considerable distance does not mean that the internal opening is at the upper end of this track; it will probably be found low down near the anus.

Rare Forms of Fistula.—One occasionally meets with cases of fistula with an external opening in the neighbourhood of the anus in which there is either no communication with the bowel, or in which the starting-point of the fistula is in some other organ.

Urethral Fistulæ sometimes track backwards into the perineum, and may open at one side of the anus, in which case they occasionally imitate rectal fistulæ, and the mistake may be made of dividing them into the rectum, whereas, of course, they should be laid open in the other direction, though sometimes they do open into the rectum as well as into the urethra.

Recto-vaginal Fistulæ.—The opening between the rectum and the vagina is generally about the upper level of the anal canal and about 1 inch above the vulval opening. These fistulæ have a bad reputation from the fact that they are so difficult to cure (see p. 226).

Recto-vesical Fistulæ.—These are very uncommon, and when present are generally the result of operation (see p. 225).

Symptoms of Fistula.—The first stage of almost all fistulæ is an abscess near the anus. The abscess may only cause inconvenience for a few days, and then apparently heal up. If it were the practice to open all abscesses in this situation directly pus began to form, I believe many patients would be saved from the trouble of a fistula.

The external opening of a fistula is generally quite small, and very often there is a little protruding piece of skin guarding the opening, or

a button-shaped granulation. At other times the external opening only appears as a pink depression on the skin, or can only be discovered by the oozing of pus from the opening when pressure is exerted upon the tissues in the neighbourhood.

The amount of pain which a fistula causes varies very considerably. As a rule there is very little pain, and all that is complained of is an occasional dull ache or sense of discomfort. It is usually only when a fresh track or an abscess is forming that the patient suffers any inconvenience, for at other times pain is usually absent. There is generally

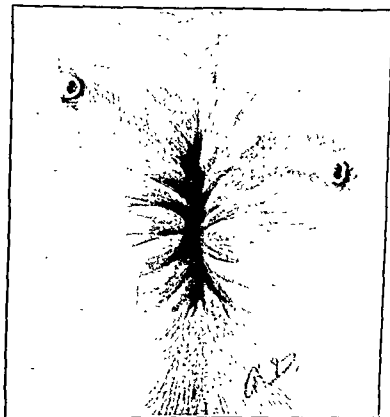


FIG 96.—FISTULA WITH TWO EXTERNAL OPENINGS.

a certain amount of discharge, though this is never large in quantity except in very extensive fistulæ. Usually the discharge is thin and watery; when, however, the fistula is increasing or active, the discharge becomes definitely purulent. The discharge often ceases for a time, only to recur again later, generally after a period of discomfort. Bleeding seldom occurs from a fistula unless it is interfered with by probing, etc.

The usual symptom complained of by the patient is a more or less constant discharge, which stains his clothing. At intervals of a few weeks, or possibly months, the part becomes very painful for a day or two; this is followed by a copious discharge, after which the pain subsides.

Often the wound appears to heal, and there is little or no evidence of its presence for long periods. Such periods of quiescence are again followed by acute inflammatory symptoms and pain. Each time that a fresh abscess forms the fistula tends to make fresh tracks and to increase in size.

Some patients who have quite large fistulæ seem to suffer extraordinarily little inconvenience. Occasionally pain in the back and pain after sitting for some time are complained of.

Tubercular fistulæ cause very few symptoms unless accompanied by ulceration of the anal margin or rectum.

Spontaneous Healing of Fistulæ.—One is frequently asked by patients what the result will be if a fistula is left untreated, or at least unoperated upon, and whether there is any chance of its healing up without operation. The proper answer to such a question is that a few fistulæ, mostly small or simple ones, do heal without any treatment at all, but that the chances of any particular fistula doing so are small; and that, on the other hand, it is much more likely that the fistula, if left alone, will track and become more extensive.

In a somewhat considerable experience at St. Mark's Hospital I have known a fistula heal spontaneously some three or four times. In each case the fistula was a small one of fairly recent date, and it was superficial.

Cases of spontaneous healing of a fistula are very rare and, as far as my experience goes, only occur in small simple fistulæ where there is free drainage. For a fistula to heal superficially is quite a common thing, but real healing is rare. What generally happens is that the fistula, if left alone, continues to discharge for some time, and then the discharge gradually stops and the external opening heals over. Under such circumstances the patient often congratulates himself that he has avoided an operation, but a careful examination at this stage will show that the internal opening of the fistulous track is still patent and is discharging. In the course of a few weeks or months pain is again felt in the part, and a tender lump forms. Another abscess has, in fact, started, and when this opens on the surface a fresh track to the old fistula is formed, and in old neglected cases of fistulæ this continues till the whole perineum, and sometimes the buttock, is riddled with fistulous tracks. The healing after operation of such old neglected fistulæ is always a long and tedious process.

The following are good examples of the time a fistula will persist without healing:

Case.—An old lady of seventy-three was admitted to St. Mark's Hospital who had suffered from fistula for fifty-two years. She had been operated upon several times, but she said that the fistula had never been healed during the whole time. There was a large semi-horseshoe fistula with extraordinarily dense walls. The dense fibrous tissue was cut away and in a few weeks complete healing took place.

Case.—The patient was a gentleman, aged seventy-nine, whom I was asked to see because he had a chronic cystitis and *Bacillus coli* had been found in his urine. He had a rectal fistula, and there seemed little doubt that the fistula was the cause of the infection of his bladder. He informed me that the fistula had been present for fifty years, sometimes being healed up for a few months, but always breaking out again. It had, with the exception of occasional attacks, caused him remarkably little inconvenience, and when I examined him I found a comparatively simple fistula, which communicated with the bowel by a minute opening. There was not a great deal of scar tissue, and he did not suffer from any loss of control or from fæcal escape. As the fistula had accompanied him through such a large portion of his life, he not unnaturally refused to part with it.

Treatment of Tubercular Fistula and of Fistula in the Tuberculous.—It is necessary to emphasize the distinction between these two conditions. A patient with phthisis may have a fistula which is not tuberculous, and by no means all the fistulæ met with in tuberculous subjects are due to infection with tubercle. The edges of a tubercular fistula are undermined and thin, the surrounding skin is bluish in colour, and the whole fistula looks callous and unhealthy. The treatment in these cases requires careful consideration. If the patient has well-marked phthisis, and if the fistula is not causing much pain or discomfort, and there is free drainage, so that the pus is not locked up, it should be left alone until the lung condition has been improved. If, however, the fistula is causing much pain and discomfort, or there is much ulceration and discharge, it should be operated upon, for, besides being a constant source of reinfection, it may seriously interfere with the patient's recovery by the discomfort which it causes. The operation should be done with the object of establishing free drainage rather than with the object of curing the fistula, and there should be as little cutting as possible.

As soon as possible after the operation the patient should be sent away to fresh country air, and live an out-of-door life, or should go direct to a sanatorium. Great improvement in the condition of the fistula results, but healing is often very slow.

The whole attitude of surgeons towards tubercular lesions has altered very much during recent years. It is now generally recognized that the general condition of the patient and his resistance to the infection is the vital factor. Treatment should be directed towards increasing the patient's general health by every possible means, and the local lesion treated so as to afford rest, relieve pain, and supply adequate drainage when indicated. One sees this changed attitude particularly in the present treatment of tubercular joint disease. Tubercular fistulæ are no exception to this rule, and we should confine any interference with the fistula to the provision of adequate drainage and the relief of pain,

and postpone a formal operation for curing the condition until such time as the patient's general health has improved to a point when we believe the maximum resistance to tubercular infection has been obtained. He should be treated in the country or in a sanatorium, and on no account kept in a nursing-home or hospital for long periods.

It is important, when operating upon a tubercular fistula, to do so in such a way that there is no danger of causing metastatic tubercular infection or a general tuberculosis by setting free tubercular organisms in the tissues at the time of operation; this is particularly important if, apart from the fistula, the patient is free from tubercular disease. If a tubercular fistula is laid open with a knife and scraped, it may result in a general tubercular infection, which is more serious than the original condition. Some years ago I had a good example of this. The patient was an apparently healthy man who was suffering from a fistula, which at the time I had no reason to suppose was of a tubercular nature. I operated upon him in the ordinary way. About a week after the operation the patient developed swelling and pain in the left knee-joint, which gradually got worse in spite of treatment. The fistula in the meantime healed up, but the condition of the knee became worse, and it was soon evident that he had developed tubercular disease of the knee-joint. I think there can be little doubt that in this case the fistula was tubercular, and the operation set free organisms which infected the joint. In order to avoid such complications, the fistula should either be laid open with a Paquelin's cautery or diathermy knife instead of the knife, or strong carbolic acid lotion should be freely applied to all the raw surfaces after laying open the fistula. In this way any risk of causing a general infection can be avoided.

Cancer and Fistula.—It is sometimes stated that an old fistula may result in the formation of cancer of the rectum. This is, I think, rather doubtful, but undoubtedly the two conditions are occasionally found associated. In two cases I have seen an adeno-carcinoma of the rectum which has tracked down along an old fistulous track and invaded the skin around the external orifice of the fistula, so that the patient was actually suffering from an adeno-carcinoma of the skin in the perineum, the growth really being continuous with the primary adeno-carcinoma in the rectum. The association is probably accidental, and there is no sound reason for supposing that the fistula was the cause of the carcinoma.

Diabetes.—In the case of a diabetic suffering from fistula we must be guided by circumstances. If the fistula is causing much pain and discomfort, and the amount of sugar in the urine is small and has been stationary for some time, there is no reason why an operation should not be performed. I have several times operated for fistula in such cases, and, although healing was somewhat slow, the results were quite satis-

factory, and there was no increase in the diabetic symptoms; the anæsthetic in such cases requires careful consideration.

Treatment of Fistula by Injections.—At various times attempts have been made to treat a fistula by some other means than by operation, and several surgeons have tried to get the fistula to close by injecting some solution into the track. One of the earliest methods, which was sometimes practised in the time of the Allinghams, was the injection of nitrate of silver, 10 or 20 grains to the ounce. The procedure was to use a syringe with a long hollow probe point. The syringe charged with the silver solution was gently passed until the hollow probe had reached the upper limits of the fistulous track. Then the silver nitrate was gently injected as it was withdrawn, each track being treated separately on different occasions.

Another, less safe, method was to force the nitrate of silver into all the tracks by an injection made into the external orifice. The treatment was repeated every two or three days.

The effect of these injections was to cause a certain amount of pain at the time, followed by a good deal of increased discharge. In favourable cases healing followed, and in some instances was complete. I have certainly seen fistulæ heal up by this method, but the result is very uncertain, and unfortunately is by no means free from risk. The silver nitrate solution is liable to cause sloughing of the tissues, and one cannot doubt that operative treatment is both safer, more certain, and more effectual. The following case from the records of St. Mark's Hospital is doubtless rather exceptional, but shows that the treatment is not free from risk:

Case.—The patient was a working man, aged about thirty. He was suffering from a very troublesome fistula; this was operated upon, but one of the tracks re-formed and refused to heal. To save him the inconvenience of a second operation it was thought advisable to try if the injection of silver nitrate would heal up this track. A few minims of silver nitrate (10 grains to the ounce) were injected into the track of the fistula. On the first occasion the patient complained of considerable pain after the injection. A second and similar injection was made three days later. Immediately afterwards the patient complained of intense pain, which continued for many hours. The same evening his temperature rose to 106° F., and his condition became very alarming. The next day he still had a high temperature, and the parts were tender and swollen. Deep cellulitis accompanied by sloughing of the greater part of the lower end of the rectum occurred, and the patient's condition became so desperate that his life was despaired of. He eventually recovered after months of illness and suffering with a serious stricture of the rectum. There seemed no possible reason to doubt that the silver nitrate injection caused the sloughing and cellulitis in this case, though it is difficult to see why so very serious a condition should result from such a simple measure.

Another method is to treat the fistula by injections of bismuth paste. This was recommended by Rawson Pennington of Chicago. The solution is as follows:

Bismuth subnitrate	1 part.
Sterile vaseline	2 parts.

The paste is liquefied in a water-bath and injected into one of the openings with a syringe, the other openings being closed so as to force the paste into all the branches of the fistula. An ice-bag is then applied to the parts to hasten congealing of the paste. A certain amount of success for this method has been claimed, but results are extremely uncertain, and more often than not a complete failure.

Injections with carbolic solutions have also been used, but it is doubtful whether any large percentage of success can be obtained by such means.

CHAPTER XII

OPERATIVE TREATMENT OF FISTULA

CASES of fistula-in-ano have always had a reputation for being difficult to cure, and it was on this account that St. Mark's Hospital was opened in 1836, so that surgeons might have the facilities for making a special study of such cases. That fistulæ are still not easy to cure is, I think, well shown by the following table of cases with a long previous history, taken from my case-books of the last few years:

3	patients	had had	a fistula for	5	years.
1	,,	,,	,,	6	,,
2	,,	,,	,,	12	,,
1	,,	,,	,,	15	,,
1	,,	,,	,,	16	,,
1	,,	,,	,,	18	,,
2	,,	,,	,,	23	,,
2	,,	,,	,,	50	,,

Nearly all these patients had been operated on a number of times before I saw them.

I do not think I shall be criticized if I state that there is only one treatment for fistula—namely, operation in some form or another. I cannot deny that cases of fistula are sometimes healed without an operation, but these are so rare, and the waste of time is so considerable, that such methods are not worth further consideration either by ourselves or our patients.

There are several different methods of operating for fistula, but the general principles underlying success are now well established and, provided they are adequately respected, success will result whichever method is adopted. The best technique will, however, be that which gives sound healing in the shortest time and with the least amount of pain and discomfort to the patient. The maxim to follow in operating for fistula is, "Provide free drainage to all parts of the track." I feel sure that the reason why many surgeons have failed to obtain proper healing after operating on fistulæ is not that they did not provide adequate drainage of the fistulous track at the primary operation, but that they did not appreciate the importance of providing adequate drainage during the whole period of healing. This is shown by the fact that the healing is generally rapid at first, but when the fistula appears to be almost healed the process appears to stop and further healing fails to occur.

The explanation is that the drainage has become inadequate. When a fistula is very large and its tracks are deep, we cannot always "provide free drainage to all parts of the track" without danger of producing incontinence, and it is here that experience is of the utmost value. A happy compromise provides the best course in such cases, for it must always be remembered that it is both easier and better to perform a second operation for the purpose of re-establishing good drainage, when the wound has shown signs that it will not heal further, than to have to perform a second operation for incontinence.

It is still often taught that the non-healing of a fistula is due to the movements of the sphincter muscle, and that on this account it is essential that the muscle should be divided in order to obtain healing of the fistulous track. While I do not deny that the movements of the sphincter muscle are a factor in preventing healing, I am sure, from my own personal observation in numbers of cases, that the movements of the muscle are a very small and unimportant factor. The really important hindrance to the spontaneous healing of a fistula is inadequate drainage. If the track of the fistula is thoroughly drained by a carefully planned incision of the parts, healing will take place, even if none of the muscular structures have been divided. It is essential, however, not only to provide adequate drainage at the time of the operation, but so to plan the wound that there shall be adequate drainage of the deeper parts of the track until these deeper parts are healed.

When possible, the wound should be so planned that the portion of it involving the skin is considerably wider and larger than the portion involving the mucous membrane and the bowel; this will often require what at first appears to be an unnecessarily large wound. When operating at St. Mark's, I have often found that onlookers have been surprised at the amount of skin which I have cut away, no less than at the fact that the sphincter muscle has not been cut at all. The object of cutting away so large a proportion of skin is to provide a free opening to the fistulous track, which will remain a free opening until the track itself is healed.

It is rather generally supposed that the main track always passes deep to the external sphincter and that its division will involve cutting this muscle. Fortunately this impression is erroneous, and it is in not more than one-third of the cases that division of the main track will involve division of the sphincter muscle. I would advise that the external sphincter should never be completely cut across at the primary operation, but that, if it is necessary, the procedure should be postponed to a secondary operation some two or three weeks later. The advantage of postponing the division of the muscle for two or three weeks is that by that time the muscle will be held firmly in the surrounding fibrous tissue of

the healing wound, and the ends will not retract when the muscle is divided. When it is necessary to divide the sphincter laterally, this should on no account be performed at the primary operation, as incontinence in some degree will almost certainly result from the retraction of the muscle ends, which are laterally quite unsupported. Owing to the fact that the external sphincter is attached both behind and to some extent in front,

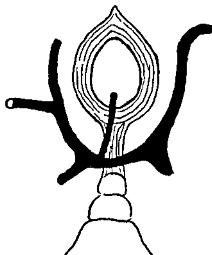


FIG. 97.

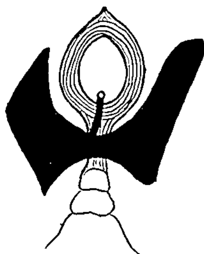


FIG. 98.



FIG. 99.

division here is not so dangerous as at the sides. There is still alive an old fallacy that incontinence is most to be feared when the internal sphincter is damaged. As a matter of fact, the internal sphincter is of no importance from the point of view of the continence of the anal opening, and it can be cut with impunity providing that damage is not done to the external sphincter, which alone is responsible for the integrity of the

anal opening. It used to be taught by Hilton, and is still sometimes taught in textbooks, that division of the sphincter muscle is necessary to obtain healing of a fistula, but this is not true, and the only excuse for dividing the muscle is that adequate drainage cannot otherwise be provided, a condition of things which is only present in the minority of fistulæ. Figs. 97, 98 and 99 illustrate the two-stage method of dealing with a complete horseshoe fistula.

Certain types of fistulæ present exceptional difficulties, and special means are necessary to deal with them, but the following account illustrates a method of getting over such difficulties:

The patient had a large deep track which involved the whole of the side of the anus, and he had been under treatment for a very considerable time before I saw him, as his medical advisers were, quite rightly, afraid of causing incontinence if the track was freely opened up. It was clear that healing could not be expected with so deep a track unless the muscle was cut across to enable the wound to be opened into the bowel. To get over this difficulty, the track was opened as widely as possible without division of the muscle, and the back portion of the wound was deepened to allow of free drainage of the anterior part. In this way healing of the anterior portion was obtained at the expense of the back portion, until all that was left was a deep track almost completely posterior to the anus. This was then laid open into the bowel and complete healing was obtained without the risk of incontinence which would have resulted from lateral division of the external sphincter in so deep a wound. In other words, by this method the fistulous track was shifted from an unfavourable position to one where it could be more easily and safely dealt with. In cases of difficult fistulæ this method of dealing with part of the fistula at a time, instead of doing everything at one sitting, is by far the best. It may involve the patient in several operations, but this is of small importance if the ultimate result is all right.

Operative Treatment of Fistula.—There are several methods of operating for fistula, each of which will be described here. Thus the fistula may be excised and the wound sewn up; the fistula may be simply excised and the wound left open; or the fistula may be incised and the wound left open. Obviously, the ideal method is to excise the fistula and completely sew up the wound, so as to obtain primary union; but this method, while ideal on paper, is seldom satisfactory in practice. As has already been mentioned in connection with the operation for piles, wounds at the anal margin which are stitched up seldom heal satisfactorily. Primary union of the wound rarely takes place, and when it fails to do so, pockets and channels form, which interfere with the healing of the wound and often necessitate its being laid open again; the stitches, too, are very

liable to cut out. Nor is this method applicable to complex and horseshoe fistulæ, which are particularly the cases where primary union would be of the most value.

Excision of the whole fistulous track, leaving the wound open, is a very satisfactory method when it can be carried out without sacrificing valuable tissue or leaving too large a wound; but this method is also not applicable to the more complicated fistulæ. One has always to remember that one must not leave the patient with a damaged anus or a mass of scar tissue, as this will cause more trouble than the fistula itself.

Simple incision of the fistulous track still remains the best operation for the majority of cases. As it is the operation most frequently applicable and most successful, it will be described first and at greater length than the other methods.

Preparation of the Patient.—The patient should be carefully prepared for operation, the object being to insure that the rectum is empty, and will remain so for a reasonable period after operation. The patient should be prepared in the same way as has been described in the case of the operation for piles (p. 41). Careful preparation is most important, for though we cannot obtain an aseptic field of operation, owing to the infective material in the fistula itself, we can at least prevent further infection of the wound, and, moreover, we can thus prevent fæcal material from coming in contact with the wound until granulation has commenced. Attempts have been made by injecting carbolic acid or some other antiseptic along the fistulous track to render the latter aseptic, but my experience has been that there is little to be gained by this plan. Anyone, however, who doubts the value of rendering the parts as clean as possible has only to observe the difference between a fistula operated on in this way and one where fæcal material has been allowed to come in contact with the wound either during or immediately after the operation. A few days after the operation it will be seen that, whereas in the former case the wound is clean and already granulating, in the latter it will be sloughy, and healing will not have begun.

The skin round the anal margin should be shaved and painted over with iodine solution.

It is a great mistake to operate upon a fistula when there is acute inflammation; when much pus is being discharged or a large abscess is present, the operation should not be performed. The proper treatment in such a case is to insure that there is free drainage, if necessary enlarging the existing openings for the purpose, and to have the tracks and pockets frequently irrigated with peroxide of hydrogen or some suitable antiseptic solution. Frequent fomentations and hot baths will also assist in the process of cleaning up a fistula; this often means delay, which is

irksome to the patient, who naturally desires to get the operation over as soon as possible. It is, however, of considerable importance in obtaining a good result, and saves time in the end, as it much reduces the size of the wound which has to be made when the fistula comes to be operated upon.

Position.—The best position for operating upon a fistula is the lithotomy position. The lower end of the table can be tilted up, or a small hard cushion placed under the sacrum; this gives a much better view of the parts and renders them more accessible.

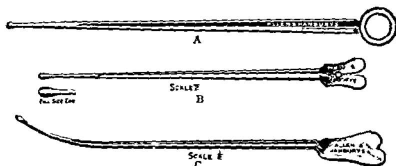


FIG. 100.—FISTULA DIRECTORS
A, Allingham's pattern; B, silver probe director pattern; C, St. Mark's Hospital pattern.

The patient should be in a good light in front of a window; or a good artificial light should be used, which will illuminate the parts and show up the deeper portions of the wound. A good light is particularly important when a difficult fistula has to be operated upon.

The semi-prone position on the side may be preferred in some cases, and the patient should then be placed on the same side as the fistula—that is to say, with the fistula on the lower side. This position is not so convenient where a horseshoe fistula has to be dealt with.

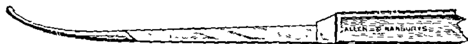


FIG. 101.—BISTOURY.

Instruments.—It is very necessary that the surgeon should be provided with the proper kind of probe directors; these should consist of several straight and curved steel probe-pointed directors (Fig. 100) and one or two flexible silver ones. A probe-pointed knife is also a very useful instrument (Fig. 101). A pair of Salmon spring scissors with moderately fine blades should also be provided (Fig. 102); while yet another useful instrument is a straight steel-grooved director in which the groove is taken to the end of the instrument.

Operation in the Case of a Simple Fistula.—The simplest kind of fistula to operate upon is that in which there is one straight track between the external and internal openings. Before proceeding to deal with the fistula, it is most important in all cases to make a very thorough examination with a view to ascertaining that there are no other tracks or complicating conditions. One is often able to find out considerably more about a fistula when it is examined under an anæsthetic than it was possible to discover when the fistula was examined in the consulting-

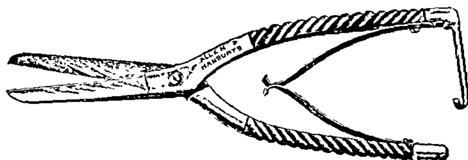


FIG. 102.

room. Not infrequently it will be found that a fistula which was previously thought to be quite a simple one will prove on examination to be a complicated one, there being deep tracks hitherto undetected. The tracks can very readily be felt between the finger and thumb, and to the trained finger are quite unmistakable. Supposing, however, it has been found that the fistula is a simple one, a curved steel director similar to the one shown in Fig. 100, with a fairly thick point, should be passed up the track of the fistula through the external opening and made to

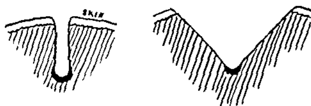


FIG 103.—DIAGRAM TO SHOW HOW THE DRAINAGE IS IMPROVED BY CUTTING AWAY THE EDGES OF THE WOUND.

emerge through the internal opening of the fistula and out at the anus. If a director with a very fine point is used, it may easily be pushed through the wall of the fistula, and part of the track will thus be missed. The director being in place, all the tissues overlying it should be divided with a knife, either by passing a curved bistoury along the groove of the director and slitting up the tissues by transfixation, or by cutting down on the director with an ordinary scalpel. The director is then free, and may be removed. A clip is next fixed to the skin at either side of the

wound to act as a retractor, and the wound is held open by the assistant. All granulation tissue lining the fistulous track is then scraped away with a Volckmann spoon, and the fibrous track left is carefully examined in a good light to make sure that there are no other tracks, the openings of such tracks, where they exist, being generally seen as dark holes lined with granulation tissue. If there is a large amount of very dense fibrous tissue, it is a good plan to cut out all the fibrous tracks so as to leave a clean wound in the fat. Lastly, the edges of the wound must be freely cut away so as to leave an open wound without overhanging edges. Healing occurs much more quickly in a wound which is open than in a narrow slit with thick, overhanging edges, and, moreover, the resulting scar is smaller and less unsightly (Figs. 103 and 104). After all the cutting has been finished, the wound should be examined for bleeding-points; any vessels that spurt should be caught in clips and tied off with fine gut. It should, however, be borne in mind that the fewer the ligatures left in the wound the better for rapid healing. The wound should be rendered aseptic as far as is possible with antiseptics and a wet compress dressing applied.

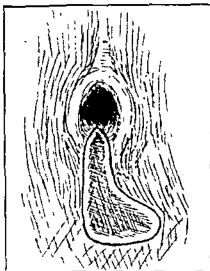


FIG 104.—DRAWING TO SHOW THE TYPE OF FLAT, OPEN WOUND WHICH IT IS DESIRABLE TO LEAVE AFTER OPERATING FOR FISTULA.

Complicated Fistula.—When the fistulous track is not straight, or there are other tracks communicating with the same internal opening, as in Fig. 105, the external tracks should first be carefully laid open, and last of all the track passing to the internal opening should be divided in the way already described, care being taken to make the incision into the bowel in an antero-posterior direction, or in the case of a fistula with a lateral internal opening radially to the anus. Oblique incisions through the anal margin should always be avoided, as they are apt to result in loss of control and to leave a badly shaped and unsightly scar. It is well to bear in mind that, with very few exceptions, there is only one internal opening to the fistula, and that in all cases the anal margin and

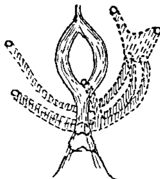


FIG 105.—COMPLICATED FISTULA WITH SEVERAL CROSS TRACKS AND AN INTERNAL OPENING.

external sphincter, if involved, must only be divided in one place, and preferably not at all at the primary operation. All islands or promontories of skin and tissue left after the tracks have been laid open should be cut away. Nothing is gained by preserving them, and they seriously interfere with healing. The diagrams given here, in which the track of the fistula is shown as a thick black line, and the wound which should be left after its division by a thin line, will serve to illustrate the manner in which the operation should be performed. Several typical forms of fistula are shown (see Figs. 106 and 107).

Horseshoe Fistula.—In dealing with a horseshoe fistula one may proceed in either of the following ways: The external tracks on each side of the bowel are first laid open by passing a grooved director through one of the external openings along the track, and slitting up the tissue over it with a curved bistoury passed along the groove of the director. (For this purpose, unless there are numerous external openings, a director grooved to the end will be required.) Or one may use a probe-pointed fistula knife, such as that illustrated in Fig. 101. In this way the tracks not involving the bowel are laid open one after another until only the fistulous track which passes forward to the internal opening remains uncut. This is then divided on a grooved probe-pointed director passed through the track from the centre of the posterior wound (Fig. 106). An alternative method, which will sometimes be found easier, is first of all to expose the internal opening (which, as already mentioned, will in most cases be found posteriorly in the midline) by dilating the sphincter, and, if necessary, passing a speculum. A steel director is then passed into the opening from the bowel, and pushed straight backwards till its point can be felt or seen beneath the skin posteriorly in the midline. The end of the director is then cut down upon, and its point made to emerge through the wound posteriorly. The tissues overlying the director are then laid open by passing a bistoury along its groove. The side tracks are next divided by passing the director from the back part of the first incision along the director and out of the external opening, first on one side and then on the other. This being done, any subsidiary tracks are looked for and divided in the same way.



FIG. 106.—HORSESHOE FISTULA.

The white dots are the openings of the fistula, the dark lines represent the tracks, and the outline represents the wound left after the skin has been cut away.

When there is a very large horseshoe fistula which surrounds the anus on three sides, it is better to do the operation in two stages, the external tracks being laid open at the first operation, and when these are nearly

healed, the posterior track communicating with the bowel being laid open at a second operation. The objection to performing the operation in one stage is that, owing to the skin supports of the lower end of the bowel being cut away and the bowel divided, a certain amount of retraction is likely to occur, with resulting deformity of the anus; and also that, for the same reason, the ends of the sphincter where this muscle is divided will very possibly not heal in good position, and as a result there may be loss of control after healing is complete. This can be avoided by doing the operation in two stages, as by the time the sphincter is cut the neighbouring parts are well supported by new tissue formed after the healing of the wound. By carefully planning the operation in two stages a good rectal surgeon will be able to avoid the risk of incontinence following an operation for fistula, even when dealing with the most extensive fistulæ. It is always well to bear in mind that the worst possible result which can follow an operation for fistula is incontinence. When the fistula has resulted from a double ischio-rectal abscess, there will almost invariably be a posterior opening into the bowel, and a deep cross-track just behind the anal wall; this track is frequently missed.

Tracks running up the Bowel.—It often happens that on investigation of the fistula after some of the tracks have been laid open, it is found that one or more of the tracks run up the bowel and parallel with its walls. Such tracks can usually be laid open into the rectum, so as to give them free drainage, but this will depend upon their relationship to the muscular structures. If the division of such a track involves dividing the muscular coat of the rectum, it is better to drain it externally by means of tubes or to deal with it by means of an elastic ligature which will divide the overlying tissues slowly. Submucous tracks which pass a long way up the rectum cannot be divided safely, because there will be no means of controlling the bleeding. Considerable difficulty may be experienced in dealing with high-lying tracks, and when in doubt the surgeon will be well advised to drain them with rubber tubes. I have on several occasions reverted to the ligature when having to deal with very high submucous tracks the division of which would have caused serious difficulty in controlling the bleeding. A piece of rubber or a strong silk ligature is passed through the track and made to emerge at the end through the mucous membrane. The rubber or silk in then tied as tightly as possible and left *in situ*. It will come away in the course of a week or two, and leave a clean healing wound.

Fistulæ with a Lateral Internal Opening.—As already stated, such fistulæ are rare; nevertheless, they are occasionally met with, and require very careful treatment, as they are particularly liable when operated upon to result in incontinence. In cases where it is necessary to divide the sphincter muscle, great care must be taken to cut it cleanly at right angles,

and to leave a straight wound which will heal up so as to bring the ends of the sphincter well into accurate contact when the wound is healed. The sphincter should never be cut through laterally at the primary operation, but a two-stage operation should be done. It has already been pointed out that the track leading to the internal opening passes superficial to the external sphincter in most cases, and it will be possible to lay open the fistula without cutting this muscle. The old idea that healing will not occur without division of the muscle is erroneous, and on no account should the muscle be divided unless this is necessary to obtain proper drainage; but if division of the track is found to involve division of the muscle in its lateral aspect, this part of the track should be divided at a subsequent operation.

A very good plan when dealing with a case of fistula with a lateral internal opening, the division of which would involve cutting the sphincter across, and where consequently there would be a risk of damaging the subsequent control, is as follows: The outer part of the fistula is freely opened up and the skin cut away so as to establish thorough drainage, and the internal opening is widened. The external sphincter itself is left bridging across the wound. The fistula is then treated in the ordinary way for about a fortnight, or until the wound is all healed except for a small track passing just beneath the sphincter. The sphincter is then cut through, and healing will take place normally. By doing the operation in two stages in this way the ends of the muscle when cut will be held firmly in the fibrous scar tissue of the healing wound, and no serious separation will occur.

In my experience more cases of incontinence have resulted from the careless division of fistulæ with lateral openings than from any other cause.

Fistulæ in which the Internal Opening is above the Internal Sphincter.—There has been much discussion at different times as to the advisability in such cases of laying open the whole of the fistulous track, owing to the liability to incontinence which exists as the result of division of both sphincters. I have seen many cases in which both sphincters have been cleanly cut through posteriorly, where the wound has healed up quite satisfactorily, and the control has subsequently been normal. One need not hesitate to divide it should this become necessary for the purpose of healing the fistula.

As a matter of fact, the so-called internal sphincter has very little to do with the patient's control. The muscle of paramount importance in this connection is the external sphincter, and, provided care is taken to preserve this and only to divide it in the right way, no surgeon need hesitate to cut the internal sphincter as much as may be necessary to obtain thorough and proper drainage. It is always advisable wherever

there is doubt about the subsequent control to perform the operation as suggested in two stages, and not to divide the external sphincter at the same time as large and extensive tracks are opened up.

Good healing can sometimes be secured by cutting down upon the upper part of the fistulous track from outside the external sphincter and without dividing it. If good drainage can be established to that part of the track in immediate relation to the internal opening, and care is taken by frequent dressings and irrigation of the wound to keep the parts clean, the upper part of the track and internal opening can often be made to heal. If it is then found that the lower part of the track is not healing, the external sphincter may be carefully divided at a second operation. There are few

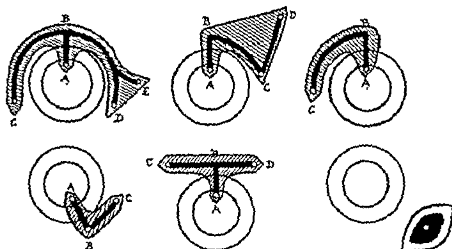


FIG. 107.—DIAGRAMS TO SHOW THE METHOD OF INCISING DIFFERENT FORMS OF FISTULÆ

A, Internal opening; B, nearest point of fistula radially from A The incision from B to A is made after the remainder of the fistula has been divided. In each diagram the fistula is shown as a black line, the openings as white dots, and the shaded areas show the shape of the wound left after operation (the upper end of each diagram is posterior).

things worse than to leave a patient after an operation for fistula with an incontinent anus; it is far better to leave him with an unhealed fistula.

Blind Internal Fistula.—In this type of fistula the sphincter should be well stretched, and a speculum, preferably of the " duck-bill " type, put in the bowel so as to give a good view of the internal opening. A probe-pointed director should then be passed into the fistula from the bowel opening, and its point made to press up against the skin at the extremity of the fistula. This should be cut down upon so as to make the fistula complete, and the tissue overlying the director slit up. The rest of the operation is the same as for an ordinary complete fistula.

Blind External Fistula.—There may be two, or even three, external openings having no communication with the bowel; or, more frequently

there is an abscess communicating by one of several openings with the surface. The tracks or abscess should be opened by a crucial incision, and the skin and tissue cut away so as to produce a shallow wound, the superficial or skin part of which is considerably larger than the deep part. *If no communication with the bowel is discovered*, it is quite unnecessary to lay the wound open into the bowel. Such fistulæ heal very rapidly if well opened up by free incision. They should subsequently be treated in just the same way as an ordinary fistula.

Fistulæ with Two Internal Openings.—When there are two internal openings, they should not be divided at one operation unless they lie one above the other, so that the one incision can lay both open into the rectum. The best plan is to lay one open, and to leave the other until the wound resulting from the first operation has healed.

Operation with Suture of the Wound.—Various attempts have been made from time to time to hasten the period of healing of fistula wounds. The obvious one is to excise the track of the fistula and suture the wound, with a view of getting healing by first intention. This method is by no means new, as it was carried out as long ago as 1840 by Syme and others. Although successes have been obtained, the method is not a practical one. as the proportion of failures is much too high. This method has not established itself, and most of us have discarded it. It will not succeed with large and complicated fistulæ, and it is just in these cases that it would be of most use. More success attends secondary suture of the wound after excising the track, but this also is not entirely satisfactory. This practice is only suitable for comparatively simple fistulæ, and even then it is seldom that anything is gained by it.

It is essential that the operation should be carried out under the strictest antiseptic precautions, as everything depends upon primary union of the wound. If possible, the fistulous track should itself be sterilized by the injection of iodine solution, carbolic acid, or some other form of antiseptic, into the track previous to operation. Many surgeons use bismuth solution, and this has the advantage that, owing to its colour, it renders the track of the fistula very easily recognizable. The track of the fistula should be cut down upon and the fistula excised, its lumen being interfered with as little as possible. When it is certain that all the fistulous track has been removed, the wound should be thoroughly cleansed with a weak antiseptic solution, such as monsol (1 drachm to the pint). The sides of the wound must be brought into accurate position by sutures passed well through the tissues on both sides and beneath the bottom of the wound (Fig. 108). The wound should, in fact, be sewn up in the same way as in sewing up a ruptured perineum. Everything depends upon accurate apposition of all parts of the wound. If the wound is large, one or two traction sutures of silver wire or stout fish-gut may be

used to support it. Personally I prefer to use medium-size fish-gut as the suture. A very good plan, when it can be carried out, is to raise a small flap of mucous membrane opposite the inner surface of the wound, and to bring this down and stitch it over that portion of the wound which is exposed in the bowel. If the stitches are tied too tightly, they will cut out prematurely, and a great deal of the success or otherwise of the operation depends upon the care and accuracy with which the stitches are inserted. Needless to say, the wound must be kept aseptic as long

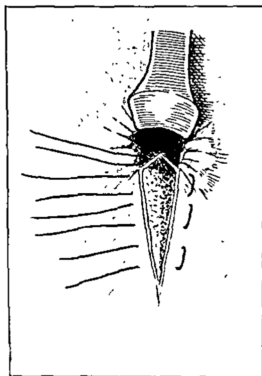


FIG 108.—METHOD OF SUTURING THE WOUND AFTER EXCISING A SIMPLE FISTULA.

as possible, and absorbent sutures must not be used, as they will act as wicks in carrying infection to the deeper parts of the wound.

The success of this method of treating fistula depends very largely upon cleanly cutting away the whole of the diseased tissue and bringing the parts into good apposition without too much tension, and particularly upon thorough asepsis both after and during operation.

While such operations are very attractive on paper, they have not proved satisfactory in practice. Surgeons cannot afford to have failures, and such operations involve a risk of failure of about 30 per cent. Moreover, there is very little to be gained, as they are only possible with very

simple fistulæ, which by the ordinary method heal quite readily, and they cannot be applied to the difficult and complicated fistulæ, where they would be of great advantage.

Excision of Fistula.—The method I have been using now for some time with great success is that of completely excising all the fistulous tracks and leaving the wound open to granulate. The chief points of this method are that every trace of the fistulous tracks must be completely excised. This often requires a good deal of patience and care to avoid injury to the mucous membrane of the rectum or to the sphincter. It is necessary to keep one finger in the rectum while dissecting out the track, otherwise injury to the bowel will almost certainly result; no minute portion of the fibrous track must be left behind. The dissection is done with a sharp knife and the vessels are, as far as possible, controlled by twisting rather than by ligature. The fibrous tissue forming the track should be picked up with forceps, and dissected out with a few touches of the scalpel. When the tracks have all been completely dissected out there will be a large wound lined with healthy fat. All fibrous tissue must be cut away and only healthy tissue left, with the exception that the track into the bowel is left untouched. After all tracks have been excised the resulting wound is washed out with strong antiseptic and a large flat compress is put on all over the wound and anus. A most important point is that no packing of any kind must be placed in the wound. The skin is freely cut away so that there is excellent drainage and blood cannot accumulate. The compress is kept wet so that it does not seal up the wound. Such a wound rapidly falls together and the deep parts heal readily. No attempt must be made to probe the wound or to irrigate it, as this would delay healing. In a very short time it will be found that there is only a shallow wound which is granulating quite healthily. The track into the bowel can then be divided under a local or general anæsthetic, and healing will be completed in about half the time usually necessary. This method has given excellent results and saved weeks of convalescence, but I do not advise it to anyone who has not had a fairly extensive experience of rectal operations, as the dissecting out of a deep and complicated track is rather tricky, and it is only in such cases that there is any great advantage in the method. The following case will suffice to illustrate its advantages:

Case.—The patient was a man, aged forty-three, who had undergone two previous operations for fistula without success. There was a large semi-horseshoe fistula with very deep tracks extending almost to the apex of the ischio-rectal fossa on the left side, and an internal opening posteriorly. I dissected away the whole of the tracks except the main posterior one connecting with the bowel and left the wound wide open without packing. Ten days later I divided the posterior

track under gas, and in three and a half weeks the parts were entirely healed up and the patient was well. In the ordinary way healing could not have been expected in less than from six to eight weeks.

Special Forms of Fistula.

Recto-Urethral Fistula.—In this condition there is an abnormal communication between the urethra and the rectum, and obviously the condition can only occur in men. It may result from a number of causes, such as traumatism, wounds, and operations upon the urethral track or perineum. It may also be due to an abscess originating in the urethra and bursting into the rectum. It sometimes results from abscess of the prostate, and may occur as a secondary consequence of neglected urethral stricture. Occasionally it may have its origin in the rectum, and the track may secondarily ulcerate into the urethra. The condition is an exceedingly annoying one, owing to the constant passage of urine along the track into the rectum, or on to the skin of the perineum. Occasionally gas from the rectum may pass into the urethra, though this is far less common.

The diagnosis is not usually in much doubt, but if there is any question as to whether there is complete communication between the two canals, the injection of a little methylene blue or milk into the urethra will generally make the diagnosis certain, as the fluid can be watched escaping at the anal orifice.

This condition is often an exceedingly difficult one to cure, and the only chance of putting it right is by means of a carefully planned plastic operation after all urethral obstruction has been removed. A catheter should be tied into the bladder for ten days after the operation. The track should be dissected out by an incision in the perineum, and the urethra carefully repaired by turning down and stitching flaps in place over the gap. The opening in the rectum should be similarly repaired. Part of the wound in the rectum may be stitched up, but it is advisable to leave free drainage into that portion of it near the urethra. A tube should be kept in the rectum to prevent any accumulation of flatus. For further details with regard to the operation for recto-urethral fistula the reader is advised to consult a standard work on operative surgery.

Recto-Vesical Fistula.—This differs from recto-urethral fistula in the fact that the urine escapes constantly into the rectum, whereas in the case of recto-urethral fistula the escape occurs only during micturition. This condition is apt to be serious, as sooner or later a septic cystitis is usually set up owing to the passage of flatus and débris into the bladder along the fistulous track, and considerable trouble may be experienced in getting the fistula to heal. As in the case of recto-urethral fistula, the only chance lies in

a carefully planned operation after all obstruction both to the rectum and the urethra has been removed.

Recto-Vaginal Fistula.—This condition frequently results from injuries connected with parturition, badly fitting pessaries, or venereal ulceration. It may be met with in cases of tuberculous or carcinomatous ulceration of the rectum or vagina. Where the condition is due to extensive disease, no attempt at curing the condition is admissible unless the primary disease can be got rid of. In any case, *no attempt should be made to operate upon the patient as long as there is inflammation or ulceration present.* Recto-vaginal fistulæ not connected with extensive disease are often difficult to cure. The exact operation which it is necessary to perform will vary with the position and extent of the fistula, and with its relation to the rectum and vagina. The best method in many cases is to separate the rectum and vagina so as to get at the fistula, to repair the opening in the vagina, and also that in the rectum, and then to perform perineorrhaphy. In any case, pressure in the rectum should be prevented for some time by keeping a tube in the bowel, and the patient should be kept in bed until the wound is absolutely healed.

Fistula connected with Bone Disease.—Fistulæ due to caries of the sacrum or coccyx may track down into the neighbourhood of the rectum and closely imitate rectal fistulæ, or may open into the rectum so that they become secondary rectal fistulæ. Such cases are not at all common, but if they are to be cured it is necessary that they should be recognized.

Fistulæ are sometimes met with over the coccyx and unconnected with the rectum. These cases are described in Chapter XVI (p. 265) and are due to congenital abnormality. They may also be met with in this situation communicating with a dermoid behind the rectum.

In such cases the dermoid is generally situated on the anterior aspect of the coccyx, and it will usually be necessary to remove this bone before the cyst itself can be reached and removed. I have twice removed a small dermoid from the front surface of the coccyx, and so cured a fistula which had previously failed to heal in spite of several operations, the presence of the dermoid cyst not having been previously suspected.

Very Extensive Fistulæ.—Very extensive fistulæ are sometimes met with in connection with the rectum, and these may be very difficult to get healed up. Such fistulæ are not infrequently the result of tubercle, which should always be suspected when a fistula with very extensive tracks is found. They are, however, by no means always tubercular. Not long ago a case presented itself at St. Mark's Hospital with twenty-one external openings. This was successfully healed up after a considerable number of operations.

Complications—*Hæmorrhage.*—Serious bleeding is seldom met with in operations for fistula. Careless division of a high-lying fistula may

result in hæmorrhage which it is difficult to control; but in such a case long pressure forceps can be placed on the bleeding-point, and if it is found difficult to tie the bleeding-point off, they can be left on for twenty-four hours. Free oozing from the cut surfaces soon stops, and this can be hastened by irrigating the wound with hot hazeline solution. In the unfortunate event of the patient being a hæmophiliac, fatal hæmorrhage may occur. We have had one such case at St. Mark's Hospital in which all efforts to control the bleeding were ineffectual.

Retention of Urine.—This not infrequently occurs, especially if there is much tight packing in the bowel; and before using a catheter it is advisable to remove any such packing and see the effect. In any case, retention will pass off in a day or two.

Incontinence.—Permanent incontinence should never result from a properly performed operation for fistula, but unfortunately cases are met with in which this very serious complication has resulted. The only treatment in such cases is another operation for the repair of the anus. A description of the various operations for this purpose will be found in the next chapter. If the wound is healed and there is bad incontinence, it is quite useless to tell the patient to wait in the hope that continence will return. No material improvement is to be expected, and the best result from a plastic operation will be obtained if this is done immediately. The following case is a good example of incontinence following an operation for fistula where the operation was carelessly performed:

Case.—The patient was a wealthy and busy city merchant fifty-two years of age. Six years before I saw him he had been operated upon by a well-known rectal surgeon for a bad " fistula-in-ano." The wound had taken a long time to heal, and when he began to get about he found he had lost control over his bowel. Ever since that time he had been in constant fear of an accident owing to the loss of power to control his evacuations, and he had had to wear a pad. A subsequent operation, performed with the object of restoring his control, failed to give any relief. During the year before I first saw him he had been getting more uncomfortable, and accidents had been more frequent, so that he was almost afraid to leave his house. On examining the parts I found that the anus was simply a patulous opening, three-quarters of which was composed of fibrous tissue, and that there was a large prolapsed mass of mucous membrane protruding partly through it. There were no signs of any muscular tissue surrounding the anal opening, and it appeared that the muscle had been so damaged at the original operation that what was left of it had atrophied. As the patient was very anxious to have something done to improve his miserable condition, I operated upon him again. On exposing the parts I was quite unable, after a most careful search, to find any traces of the external sphincter muscle, and I therefore narrowed the patulous

opening as much as I dared by a plastic operation, and removed the mass of prolapsed mucous membrane. This operation gave the patient considerable relief, and enabled him to control his evacuations much better than before. But in the absence of any sphincter muscle it was impossible to give him complete control.

After-Treatment.—In my opinion, no surgeon should undertake an operation for fistula unless he is able and willing to supervise the after-treatment himself. Too often the surgeon operates upon a case of fistula, and then never sees the case again, or not until the wound has refused to heal. Most of the failures to heal in the case of fistula are due to the fact that those responsible for the after-treatment of the case do not understand what is necessary. In proof of this I may here state the fact that the average period before healing is complete after an operation for fistula at St. Mark's Hospital is under four weeks, in spite of the fact that probably the practice of this hospital includes most of the worst cases of fistula in London. The actual figures for over 200 of my own cases at St. Mark's are as follows: Average period of healing in days—males, 25·1; females, 17·7.

It is most important that the wound should be kept as clean and as free from discharge as possible, and for this purpose the dressing should be changed frequently. In the case of a large fistula wound where there is much discharge the dressing should be changed every six hours, or even oftener; and in the case of an ordinary fistula wound which is clean it should be changed at least twice a day. It is never sufficient to dress the wound only once in twenty-four hours, or, as I have known to be the practice sometimes, once every two or three days. For the first three or four days the wound should be dressed with hot fomentations, changed as frequently as possible. The fomentations should be applied over the wool which is in the wound, and the latter should be left *in situ* for the first two or three days, and then changed as soon as it is soiled. The object of leaving the packing in the wound undisturbed for the first three days is to enable the granulation wall to form. If removed earlier, the granulations will almost certainly be destroyed. The bowels should be opened on the third or fourth day by an aperient dose, aided by a small quantity of olive oil injected into the bowel. After this the patient should be allowed to sit in a hot antiseptic bath night and morning. The cotton-wool will soak out of the wound while he is in the bath, and fresh wool should be carefully laid in the wound after the bath. The wound is best dressed with flat strips of wool, which should be of the best kind, and not the cheap fluff which is so often supplied in these days. A narrow, thin strip of this wool should be carefully laid into the deep part of the wound with dressing forceps. The first finger of the left hand passed into the bowel will often assist in placing the wool

accurately in position where the track is a deep one. With the end of the forceps the strip of wool should next be adjusted carefully so that it lies evenly along the floor of the wound. Then a few small, flat strips of wool should be laid in any side tracks or superficial portions of the wound. On no account should the wound be firmly plugged with dressing. Plugging of the wound is a mistake unless one wishes to prevent it from healing, and for this purpose I know of no more effective method. The following case affords a good example of the evils of plugging the wound:

Case.—I was consulted by a young Army officer who had had the misfortune to develop a fistula. He had been operated upon by a country medical man for this condition, but the wound had refused to heal. Two further operations had been performed at intervals in the hope of getting the wound to heal, but without success; and the patient had had the mortification of watching the spring become summer, and the summer fade into autumn, while he was still laid up with his fistula. Altogether he had been laid up for six months. At first I was rather puzzled as to the cause of this, for the patient was a thoroughly healthy young man, and the wound was apparently quite superficial and healthy. Moreover, the operation appeared to have been correctly done, the most careful examination failing to reveal any unopened side tracks or complicating conditions. On careful inquiry, however, I ascertained that the wound had been most energetically plugged, and I came to the conclusion that this was the cause of the trouble. Accordingly, I kept him in bed, and had the wound very lightly dressed twice a day with a small strip of wool soaked in sterilized olive oil, with the result that in three weeks the wound was soundly healed.

When once the surface of the wound is covered with healthy granulations, it is important to protect these and the growing edge of the skin from damage each time that the dressing is changed, and for this purpose there is nothing better than a dressing of wool soaked in olive oil or vaseline. At this stage antiseptics should be avoided, as they tend to damage the delicate granulations and to delay healing. Peroxide of hydrogen, though useful as an application to clean up a sloughy wound, should not be used once the wound has cleaned up, as it tends to produce exuberant and unhealthy granulations. The wound always requires careful watching to see that healing is progressing satisfactorily. Occasional stimulation is often required. For this purpose lotio rubra applied on wool for a day or two, or Friar's balsam applied once, is very useful. Weak silver nitrate (10 grains to the ounce) may sometimes be used with advantage, but strong silver nitrate should not be used except to destroy unhealthy granulations, as it usually does more harm than good. Scarlet red ointment is sometimes useful, but it is a mistake

opening as much as I dared by a plastic operation, and removed the mass of prolapsed mucous membrane. This operation gave the patient considerable relief, and enabled him to control his evacuations much better than before. But in the absence of any sphincter muscle it was impossible to give him complete control.

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It is most important that the wound should be kept as clean and as free from discharge as possible, and for this purpose the dressing should be changed frequently. In the case of a large fistula wound where there is much discharge the dressing should be changed every six hours, or even oftener; and in the case of an ordinary fistula wound which is clean it should be changed at least twice a day. It is never sufficient to dress the wound only once in twenty-four hours, or, as I have known to be the practice sometimes, once every two or three days. For the first three or four days the wound should be dressed with hot fomentations, changed as frequently as possible. The fomentations should be applied over the wool which is in the wound, and the latter should be left *in situ* for the first two or three days, and then changed as soon as it is soiled. The object of leaving the packing in the wound undisturbed for the first three days is to enable the granulation wall to form. If removed earlier, the granulations will almost certainly be destroyed. The bowels should be opened on the third or fourth day by an aperient dose, aided by a small quantity of olive oil injected into the bowel. After this the patient should be allowed to sit in a hot antiseptic bath night and morning. The cotton-wool will soak out of the wound while he is in the bath, and fresh wool should be carefully laid in the wound after the bath. The wound is best dressed with flat strips of wool, which should be of the best kind, and not the cheap fluff which is so often supplied in these days. A narrow, thin strip of this wool should be carefully laid into the deep part of the wound with dressing forceps. The first finger of the left hand passed into the bowel will often assist in placing the wool

accurately in position where the track is a deep one. With the end of the forceps the strip of wool should next be adjusted carefully so that it lies evenly along the floor of the wound. Then a few small, flat strips of wool should be laid in any side tracks or superficial portions of the wound. On no account should the wound be firmly plugged with dressing. Plugging of the wound is a mistake unless one wishes to prevent it from healing, and for this purpose I know of no more effective method. The following case affords a good example of the evils of plugging the wound:

Case.—I was consulted by a young Army officer who had had the misfortune to develop a fistula. He had been operated upon by a country medical man for this condition, but the wound had refused to heal. Two further operations had been performed at intervals in the hope of getting the wound to heal, but without success; and the patient had had the mortification of watching the spring become summer, and the summer fade into autumn, while he was still laid up with his fistula. Altogether he had been laid up for six months. At first I was rather puzzled as to the cause of this, for the patient was a thoroughly healthy young man, and the wound was apparently quite superficial and healthy. Moreover, the operation appeared to have been correctly done, the most careful examination failing to reveal any unopened side tracks or complicating conditions. On careful inquiry, however, I ascertained that the wound had been most energetically plugged, and I came to the conclusion that this was the cause of the trouble. Accordingly, I kept him in bed, and had the wound very lightly dressed twice a day with a small strip of wool soaked in sterilized olive oil, with the result that in three weeks the wound was soundly healed.

When once the surface of the wound is covered with healthy granulations, it is important to protect these and the growing edge of the skin from damage each time that the dressing is changed, and for this purpose there is nothing better than a dressing of wool soaked in olive oil or vaseline. At this stage antiseptics should be avoided, as they tend to damage the delicate granulations and to delay healing. Peroxide of hydrogen, though useful as an application to clean up a sloughy wound, should not be used once the wound has cleaned up, as it tends to produce exuberant and unhealthy granulations. The wound always requires careful watching to see that healing is progressing satisfactorily. Occasional stimulation is often required. For this purpose lotio rubra applied on wool for a day or two, or Friar's balsam applied once, is very useful. Weak silver nitrate (10 grains to the ounce) may sometimes be used with advantage, but strong silver nitrate should not be used except to destroy unhealthy granulations, as it usually does more harm than good. Scarlet red ointment is sometimes useful, but it is a mistake

opening as much as I dared by a plastic operation, and removed the mass of prolapsed mucous membrane. This operation gave the patient considerable relief, and enabled him to control his evacuations much better than before. But in the absence of any sphincter muscle it was impossible to give him complete control.

After-Treatment.—In my opinion, no surgeon should undertake an operation for fistula unless he is able and willing to supervise the after-treatment himself. Too often the surgeon operates upon a case of fistula, and then never sees the case again, or not until the wound has refused to heal. Most of the failures to heal in the case of fistula are due to the fact that those responsible for the after-treatment of the case do not understand what is necessary. In proof of this I may here state the fact that the average period before healing is complete after an operation for fistula at St. Mark's Hospital is under four weeks, in spite of the fact that probably the practice of this hospital includes most of the worst cases of fistula in London. The actual figures for over 200 of my own cases at St. Mark's are as follows: Average period of healing in days—males, 25·1; females, 17·7.

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to use stimulating applications often. The wound must be carefully watched for signs of bridging or the formation of new tracks. The latter may always be suspected if the discharge from the wound increases in amount or fails to stop. If a previously healthy wound suddenly begins to discharge, it is an almost certain sign that a new track has formed. Any bridges of tissue that are discovered should be broken down with a steel probe or cut through with scissors, and new tracks must be at once laid open. When the wound is quite healthy and nearly healed, it is best to apply no dressing at all, but to keep the parts clean and apply a little vaseline to protect the surface.

The patient should be kept in bed, or at least in the recumbent position, until healing is quite complete; and after this for a week he should not walk about more than is absolutely necessary, so as to allow the scar to get firm before it is subjected to much movement. It is a great temptation to both doctor and patient to allow the latter to get about a little when the wound is nearly healed; but this wastes time in the long run, and often results in considerable delay in the final healing of the wound.

During the whole process of healing care must be taken to insure that the stools are quite soft, as a hard stool may delay healing for a week or more.

Causes for Non-Healing of the Wound after an Operation for Fistula.—(1) Inadequate operation. (2) Insufficient drainage. (3) Too tight plugging of the wound. (4) Bridging of the wound. (5) Some constitutional condition of the patient.

One of the most common causes of the wound refusing to heal is that some deep track or pocket has been missed at the operation. In such a case one part of the wound will be found not to heal, and on investigation a deep track will be found opening into this part of the wound. In such circumstances the only thing to do is to operate again, and freely lay open the deep track. Frequently it is the communication with the rectum that is missed at the operation, and the fact that a fistula refuses to heal is generally a safe indication that some part of the original fistula has been missed, and that further operation is essential. Very often the patient is told that the reason why the fistula does not heal is that his constitutional condition is poor, or that the fistula is tubercular in origin, whereas the real cause is that the fistula has been inadequately operated upon. At St. Mark's Hospital fully one-third of our cases have been previously operated upon elsewhere, and on examination we find that some track has been missed.

Another not uncommon cause is insufficient drainage owing to the external part of the wound not having been made large enough, so that the outer part of the wound heals up before the deeper part, and the latter, being insufficiently drained, refuses to heal.

Bridging of the wound will also prevent healing (Fig. 109). This ought not to happen if the wound is properly dressed; but should it occur, the bridge of tissue must be cut through or broken down with a probe.

Healing is rarely delayed by some constitutional condition of the patient, such as tuberculosis, diabetes, alcoholism, etc. Sometimes, when a fistula refuses to heal, a change to the country or the seaside will result in rapid improvement; but in the vast majority of cases in which a fistula refuses to heal the cause is inadequate operation or improper after-treatment.

It is often assumed on quite insufficient evidence that when the wound refuses to heal there must be something wrong with the patient—that he is the subject of some constitutional disease, such as syphilis, tuberculosis, or Bright's disease, or that some particularly malignant type of micro-organism has infected the wound. Personally, I have never believed in this doctrine, and although I do not deny that occasionally cases are met with in which the constitutional condition of the patient prevents or delays healing, I believe that in the great majority of cases of delayed healing the fault lies in the fact that the surgeon has missed some deep track, or has not laid the fistula open freely enough to provide adequate drainage. If tubercle or syphilis is the cause of the non-healing of the wound, the obvious conclusion is that the patient was not in a sufficiently good condition to be operated upon at all.



Fig. 109. — Bridging of a Fistula Wound, showing Curved Probe passed beneath Bridge.

The following suggestions in treating fistula-in-ano may be found useful: (1) Never operate for a fistula when there is an acute abscess; be content with drainage of the abscess. (2) Do not completely divide the external sphincter when operating for fistula. If it is necessary, wait until the other tracks have healed as far as they will and then divide it. (3) Look carefully for all tracks and do not leave any undivided, with the possible exception of that leading into the rectum (there is never more than one). (4) Provide very free drainage by cutting away tissue when necessary. (5) All packing should be as light as possible and should consist of cotton-wool rather than gauze. (6) Keep the patient in bed till all the wound is healed.

CHAPTER XIII

RECTAL INCONTINENCE

INCONTINENCE, or loss of adequate control over the anal orifice, is one of the most distressing complaints for which surgeons are consulted. It is difficult to imagine any condition more distressing to a sensitive person than one in which he is never certain whether his bowels will act unexpectedly at some inopportune moment. In most textbooks the subject of incontinence is dismissed in a few lines, and is often not even mentioned in the index, a happy exception being Yeoman's monumental treatise, where a whole chapter is devoted to this subject, as was also the case in the Allinghams' book, published many years ago. It is of very great importance to the proctologist for two reasons. In the first place, every surgeon who practises proctology is anxious to know everything possible about the causes of this complication, so that he may never run any risk of it in his own practice. Secondly, he will inevitably be consulted by patients who are incontinent owing to the handiwork of other surgeons, or as the result of injury.

The danger of incontinence as the result of an operation has been used as advertising propaganda by the charlatan and the quack for so long that it is very difficult to persuade patients that there is no such risk from a properly performed operation. The real truth is that in these days the patient who is operated upon by a skilled proctologist runs no risk whatever of losing control of his sphincter. The modern proctologist has learnt how to avoid this complication of operations, and though he may occasionally fail to cure a patient, he never leaves him with an incontinent anus.

It will doubtless be many years before this pernicious teaching can be entirely eradicated from the public mind, and I wish there were some means by which the layman could be assured that he runs no such risk at the hands of skilled surgeons. Almost anyone with some courage and a little knowledge can do an operation, but operating on human beings is a very delicate affair. Few of us would care to be operated on by a surgeon who got 75 per cent. successes; we want 100 per cent., or the nearest we can get to it, and it requires very special skill and much experience to reach such figures, but it is the only kind of surgery that is of any use.

There has been a lot of vague writing on the relative importance of

the internal and external sphincters, and it has often been asserted that incontinence will not result unless the internal sphincter is damaged. I have always taught that the external sphincter alone is of real importance, and that unless this muscle is intact perfect continence cannot be obtained. This has been also the view held now for a long time by American surgeons. Incontinence of the anal opening is always due to inability of the external sphincter from some cause or another to adequately close the opening and so render it gas-tight. The external sphincter is a peculiar muscle consisting of three distinct sets of fibres; it is normally contracted and voluntarily relaxed, the exact reverse of most muscles. The only other muscle in the body, I believe, that functions in a similar manner is the bladder sphincter. The internal sphincter is merely an exaggeration of the circular muscle coat of the bowel. It is not under voluntary control from the brain at all, and its function appears to be concerned chiefly with the act of defæcation. While it is important in assisting the normal action of the rectum as an organ for the evacuation of the contents of the large bowel, I doubt if it is of much value in assuring the integrity of the anal opening from a voluntary point of view. No voluntary fibres have so far been traced to this muscle from the spinal cord, and the importance attached to it by the Allinghams and their school was, in my opinion, quite unjustified. I do not think personally that the internal sphincter of the anus is of much importance, and I am sure that an individual with a hopelessly cut and damaged internal sphincter would have perfect control provided that there was no damage to the external sphincter muscle with attachments.

I can confidently assert that, although I have operated for fistula a great many times, I have never produced an incontinent anal opening, and there are no patients of mine walking round this earth cursing their misfortune and my incompetence on this account. But I have always been extremely careful to avoid injury to the external sphincter, and when it has been necessary to divide this muscle I have left this procedure till two or three weeks after the primary operation. I do not divide the external sphincter at the primary operation under any circumstances. I believe this to be a sound practice, it does not add to the time required for healing, and it ensures that incontinence will not result from the operation. The reason why division of the sphincter at a second stage operation does not result in incontinence is that the inflammatory exudate of the healing wound holds the ends of the divided muscle as in a splint and prevents their retraction, and so ensures that the minimum of scar tissue intervenes between the divided ends of the muscle. Division at the primary operation would allow of considerable retraction, as there is nothing to hold the divided muscle and prevent wide separation between the ends. I am sure many cases of incontinence could be avoided if

surgeons realized the importance of not laying open large fistulæ in a single stage operation. The plan of operation *en deux temps* which was first introduced many years ago at St. Mark's Hospital is a much better practice, and the patient will accept the necessity for having two operations instead of one if the reasons are explained to him, more especially as the second stage can be done with local anæsthesia.

A bad practice, which I have known to result in serious incontinence, is that of operating for fistula when laying open a large acute ischio-rectal abscess. When there is an acute abscess, nothing should be done beyond providing adequate drainage, and all attempts to deal with the fistula should be left till later. One is not operating for fistula, but for abscess, and this must not be forgotten.

Operations for piles should never result in incontinence if properly performed, and can only do so when portions of the sphincter are removed, or when serious sepsis follows the operation, and the external sphincter gets involved in dense fibrous tissue. Unfortunately, almost all doctors think they are competent to operate for piles, and many do so who would be much better advised not to, with the result that some dreadful results are occasionally met with. A properly performed operation for piles done by a surgeon skilled in this operation can never result in incontinence and should give 100 per cent. success.

One meets with every degree of incontinence, from the slight degree present in practically normal persons when they get an attack of diarrhœa to the condition in which the patient has no knowledge of, and no control over, the passage of his stools. But fortunately complete incontinence is comparatively rare.

Incontinence may be due to inability of the muscle to close the anal orifice adequately, or to lack of sensation, which prevents the patient from appreciating the fact that anything is escaping.

Sensation at the anal orifice is a delicate and important matter; not only does it indicate the presence of flatus or gas in the rectum, but it also differentiates between flatus and liquid. For delicacy of sensation it is comparable with the sensation at the tip of the tongue or the finger. But the sensation at the opening of the anus is not entirely tactile. There are two senses: one is tactile, produced by contact of the contents of the bowel with the mucous membrane of the anal canal; and the other is the muscle sense, which may be described as the sensation caused by the stretching of the muscle owing to the presence of something within its grip.

When we can find no mechanical cause for incontinence—that is to say, when examination shows that the muscle is intact and properly contracting—we must conclude that there is a functional cause from derangement of the nerve supply. I have never yet seen a case where

the nerve supply was damaged by an operation in the immediate vicinity of the muscle, and although we do not know the exact arrangement of the nerve fibres, both sensory and motor, passing to the external sphincter, we can conclude that they have been very skilfully planned so as to avoid the surgeon's knife. I have met with several cases of incontinence due to derangement of the nerve supply of the sphincter muscle. I may mention paraplegia, disseminated sclerosis, and more particularly tabes dorsalis.

A few years ago I had a patient sent me, aged forty, who had for six months had sudden and quite unexplainable incontinence of his anus. A most careful examination failed to reveal anything wrong with his sphincter muscle, but when I examined his reflexes I found absence of knee-jerks and Argyll-Robertson's pupils, and when I inquired I found that he had been treated for syphilis four years previously. In this case there was no doubt that tabes was the cause of his incontinence. I have seen this condition several times. It is a cause which should be borne in mind, and when an apparently unexplainable case is seen a careful examination of the reflexes instituted.

Cases of incontinence require very careful study and close examination. They are often not so serious as they appear. Some three years ago I was consulted by a young cavalry officer who had come back from India on purpose to consult me with letters from his medical officers in India. He had been operated upon one and a half years previously for fissure, and ever since had noticed a tendency to leak slightly at the anal orifice, a condition which naturally caused him considerable annoyance. Six months previously he had undergone another operation for this condition without benefit, and at last had decided to come and see me in London with a view to my operating on the muscle. I was quite unable to find anything wrong with his muscle or the nerve supply, but on questioning him I found he had been taking large doses of liquid petroleum ever since the first operation. Stopping the petroleum at once cured his incontinence, but he was much annoyed at having to make such a long trip to find out the cause of his trouble.

A cause of anal incontinence which may easily be missed is that due to retention and overflow. Just as incontinence of urine, as we all know, can result from retention of urine and overflow, so can the same cause produce incontinence of fæces. This condition is most often seen in elderly persons, or in patients recovering from serious illness. The patient begins to pass his stools under him without his knowledge, and often becomes quite incontinent. In such cases a digital examination of the rectum reveals a large mass of hardened fæces in the rectum—a stercolith, in fact. In some cases the mass may be so hard that it is necessary to break it up with a hammer and chisel. The removal of the stercolith

will immediately cure the patient. I have seen a great number of such cases, but the same condition may also rarely occur in children. I recently had a small boy aged five years sent to me who had a congenital deformity of the anus, and who ever since he was born had been quite unable to control his bowel actions. On examination I found that the anal opening, though abnormal, was quite efficient as regards the size of the opening and the contraction of the muscle. His whole colon was loaded with fæces, and the cause of his lack of ability to control his stools was retention and overflow. The boy had been kept constipated on purpose, as it was wrongly supposed that this was the best way to treat him. After thoroughly clearing him out, which took several days, he had normal control over his stools.

A very important form of incontinence is that due to congenital abnormalities of the anal opening. Many of these can be corrected, but if the external sphincter is completely absent only a partial cure can be obtained. I often have children brought to me with such deformities, and if the condition is compatible with life—that is to say, if the bowels can be properly relieved—I advise that they should be left as they are till they are nine or ten years old, and then operated on to remedy this condition. Plastic operations on small babies cannot be done satisfactorily, and it is much better to leave them till they are a reasonable size. If the condition is such that proper evacuation of the bowels cannot be obtained, an immediate operation to enlarge the opening should be done, and the plastic operation postponed till they are nine or ten years old.

I recently had a child brought to me who had an imperforate anus at birth, which had been treated by incision, but the opening was very inadequate and surrounded with scar tissue. He was continually having to be dilated, and his bowels could only be emptied with great difficulty and pain. He was terrified of doctors and in a pitiable condition. I operated upon him, removing all the fibrous tissue and bringing the mucous membrane well down through a good free opening, and stitching it to the skin. This new opening functioned well and did not require any dilatation. The change in the boy in a few weeks was startling. He began to put on weight and enjoy life, and when I saw him again six months later was hardly recognizable for the same miserable object he had been. More surprising still, his mother stated that he had almost normal control over his bowel actions and was able to go to school.

I have often noticed that when an adequate opening is secured, even where no proper sphincter exists, and the child is young, a quite surprising degree of control generally results. Children have an amazing capacity for readjustment which is not present in adults.

Another cause of incontinence is prolapse of the rectum, or procidentia. If there is a large prolapse, 2 inches or more in length, coming through

the sphincters, considerable incontinence must ensue. The presence of the prolapse stretches the sphincters and renders the anus patulous; the contents of the bowel no longer come into contact with the sensitive anal orifice, and therefore incontinence results. A considerable degree of incontinence of fæces will result from a stricture of the rectum, and this cause should always be excluded.

There are several types of incontinence due to operation. The commonest by far, in my opinion, is after operations for fistula, due to too free or unwise cutting by the surgeon. Badly performed operations for piles are also not uncommon causes, and Whitehead's operation for piles, which, I am thankful to say, is now only of historical interest, was a potent cause of partial incontinence.

Where there is stricture right at the anal orifice, one would naturally expect there would be considerable incontinence, because the sphincters cannot act, owing to the fibrous tissue interfering with the action of the muscle; but stricture a couple of inches up the rectum also causes more or less complete incontinence. The incontinence in the latter case is similar to that associated with cancer of the bowel; there is a spasmodic action of the bowel, over which the patient seems to have no control. Stricture of the rectum causes diarrhœa, and the patient has very little control when the bowels act.

Apart from operations, damage to the sphincter is due to two main causes: one is ruptured perineum, the other accidents involving damage to the sphincters.

Such injuries are generally due to people falling from some height on to sharp objects. One patient fell from a pair of steps upon the handle of a broom, which entered the anus and badly tore the rectum; another patient was a railway porter who jumped from a train and fell on the handle of a lever for altering the points. I had to attend one gentleman who sat down rather heavily on a shooting stick while shooting pheasants; the stick split and he impaled himself on the lower end. He damaged his rectum and bladder, but I was able to get him all right.

During and just after the war I had a number of cases of incontinence due to injury from bullet and shell wounds. In most of them the sphincter had been divided posteriorly and had retracted. There was a large hole in the situation of the anus, and the fibres of the external sphincter could be seen at the anterior part of the orifice, but the muscle was quite unable to close it, and, in fact, only acted upon a very small part of the opening. Such cases required a complete plastic closure of the opening, and careful suturing of the divided muscle around the posterior portion. The results were excellent, but it sometimes required more than one operation to secure a perfect result. In a few cases the sphincter had been completely destroyed, and it was then

The most difficult cases are those where there is a dense mass of hard fibrous tissue. The blood-supply is sure to be bad, and this makes it difficult to get transplanted flaps of skin to heal into place, and also it is often a matter of the utmost difficulty to find the ends of the external sphincter amid a mass of fibrous tissue. I know of no cases which involve more care or give the surgeon more anxiety than these.

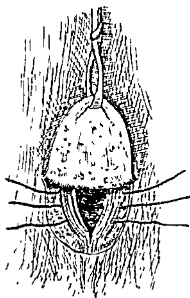


FIG. 110.—OPERATION FOR PATULOUS ANUS WITHOUT DIVIDING THE MUSCLE.

Apart from those cases due to congenital absence of the sphincter muscle, and cases of disease of the central nervous system, there are very few cases of incontinent anus that cannot be cured by a carefully planned operation, and there are certainly no operative results which give more satisfaction to both the patient and the surgeon.

Plastic Operations for restoring the Anal Margin.—It sometimes happens, after removing a new growth that is not malignant, or as the result of an injury or a burn, that the anal margin is so badly damaged that some form of plastic operation is necessary. In several cases I have been obliged to remove quite considerable portions of the skin at the anal margin for X-ray burns or because the anal margin was so involved in fibrous scar tissue that proper function could not be secured without the removal of all the scar tissue. In such cases skin flaps must be made and drawn into position so as to leave healthy soft skin round the opening.

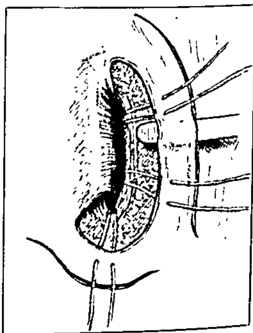


FIG. 111.—PLASTIC OPERATION FOR RESTORING THE ANUS.

In a few cases I have performed the following operation with excellent results: Incisions are made parallel with the outer edge of the denuded area and about an inch wide, and these are carried down into the fatty tissue

(Fig. 111). The flaps so formed are raised by dissection with a knife, aided by a flat spatula, care being taken to leave sufficient attachment to insure a good blood-supply to the flaps. Stout mattress sutures of silk are then inserted through the stump of mucous membrane and through the inner edge of the flaps. When these are tied up, the flaps are drawn

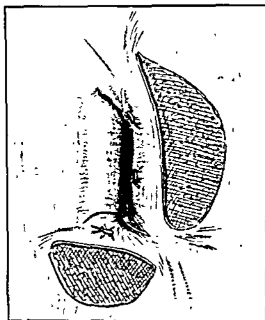


FIG. 112.—PLASTIC OPERATION ON ANUS COMPLETED.

into the anal orifice and cover over the denuded area, leaving raw surfaces out on the buttocks. It is advisable not to stitch the flaps too accurately, but merely to insert sufficient sutures to keep them in place. The condition of affairs when the sutures are tied up is shown in Fig. 112. The raw areas left will heal with very little scarring or contraction, and an excellent result can in this way be obtained.

CHAPTER XIV

PRURITUS ANI

In various degrees pruritus ani, or irritation round the anal opening, is a very common complaint and about one quarter of the patients consulting a proctologist come on account of it. It may be only a slight itching lasting for a few days and then passing off, or easily amenable to treatment, or it may be a most serious condition coming on in paroxysms which drive the patient nearly mad and prevent him, or her, from obtaining any proper sleep, often for weeks at a time. The more serious cases may cause very considerable ill-health, and some patients are rendered almost suicidal. The patient is afraid to go to bed, as the itching is always worst at night. In some cases the patient is unable to get to sleep on account of the itching and remains awake for hours scratching and applying remedies, only at last to fall into a short troubled sleep. In other cases he falls asleep normally, only to be awakened with violent irritation at a certain hour, and is unable to get to sleep again.

The condition seems to be slightly commoner in men than in women. It occasionally occurs in children, but is uncommon in young people. I was recently consulted about a child, aged five, with very bad paroxysmal pruritus ani, but such cases are rare. It is most often seen in otherwise healthy individuals in the prime of life, and frequently in those who lead a sedentary life.

The sufferer complains of an intense itching beginning just at the margin of the anus. The itching may be localized to quite a small area, or may spread to all the perineal skin. The most intense irritation is generally just at the opening of the anus and along the median raphe in front and behind. Sometimes the itching is more or less continuous, while at other times it only comes on in bouts. It is usually much worse at night, the itching coming on as soon as the patient has become warm in bed and is just about to go to sleep. I have seen patients who for weeks had hardly had a proper night's rest on this account. The patient invariably scratches himself to try and stop the itching, but only the most temporary relief results. Many patients complain that their lives are rendered quite miserable by this complaint, and they are willing to undergo any form of treatment that will give them freedom from the itching. Many have told me that the intense irritation is more difficult to bear than pain, and I believe this to be true.

The examination of a case of pruritus ani generally reveals a somewhat wrinkled or corrugated condition of the skin at the anal margin. In cases of old standing there is a warty condition of this skin, and on close examination it can be seen to be much thickened, the thickening chiefly affecting the horny layer of the dermis. The surface of the skin usually has a moist, wash-leathery appearance, the tops of the ridges especially being sometimes quite white. There is generally a certain amount of redness of the surrounding skin, and well-marked abrasions, which have resulted from scratching, can usually be seen.

Sometimes the wash-leathery appearance of the skin extends for a considerable distance around the anus, and there is frequently a small patch of it just over the tip of the coccyx and between the buttocks. Much, if not all, of the appearance seen around the anus in old cases of pruritus is to be attributed to the scratching which has resulted from the irritation rather than to any result of the condition itself. In some cases the skin may show marked changes over a considerable area, the skin over the buttocks, sacrum, and scrotum being involved; in such cases the condition closely resembles eczema.

I think most surgeons will agree with me that the thickening of the skin, the rugæ and eczema, fissures and other abnormal conditions of the skin around the anal orifice, which are so frequently seen associated with pruritus ani, are purely secondary results of scratching, and, beyond the fact that they tend to accentuate the itching and interfere with treatment, have no causal relationship to it. I am, myself, certain that this is so.

Pruritus ani is no more a disease than is headache or vomiting; but, like these, is a symptom which may complicate many diseased states, and it has only earned the distinction of being sometimes called a disease because in many cases we have failed to find the true cause.

I am convinced that the exciting cause of pruritus is a local one in all cases, and that constitutional states have merely a predisposing or secondary influence in causing the itching. It must be admitted that in some cases the most careful search fails to discover any local cause; but this is because our knowledge is insufficient to enable us to discover it, or, perhaps, to recognize it when seen.

There has been much discussion as to whether pruritus ani should be considered merely as a symptom or as a disease in itself. Matthews considered it to be a definite disease of the skin characterized by itching; others, again, consider that it is always a symptom, and that some cause, either constitutional or local, can be found for it. I believe the condition always arises locally, but in a case of old-standing definite disease of the nerve endings is present owing to the effects of constant scratching.

Etiology.—Pruritus is very likely to occur in persons of the plethoric type, who habitually indulge in excessive eating and drinking, and it is

an undoubted fact that when such patients are put upon a strict regimen the condition is always improved, or, in other and simpler words, there is a close association between pruritus and dyspepsia.

Among the constitutional conditions which are frequently ascribed as the cause of pruritus must be mentioned gout, rheumatism, nephritis, diabetes, and disease of the liver. With regard to gout and rheumatism, I am inclined to think that they are characteristic of the type of patient who suffers from pruritus rather than causes of the disease.

There are some patients who undoubtedly get attacks of pruritus as the result of indulgence in certain forms of food. Such patients say that they always have an attack of pruritus after eating shellfish, or it may be strawberries; others, again, say that indulgence in alcohol, or tea, or coffee, will bring on an attack, and excessive smoking has the same result in some cases.

Some medical men believe that excessive fermentation in the intestinal tract is a potent cause of pruritus, and insist upon the importance of prescribing remedies which are aimed at the prevention of this condition in all cases of pruritus.

The anal skin and mucous membrane have certain peculiarities which have an important bearing upon the cause of pruritus. The mucous membrane lining the anal canal and the skin at the anal margin is richly supplied with sensory nerves, which act as the sentinels of the rectum, and these nerves are some of the most sensitive in the body to tactile influences. Not only are the nerve endings in the dermis very numerous, but there are a very large number of nerve endings in the subcutaneous tissue in this region. As a rule the most intense sensation is at the muco-cutaneous junction, which is also the point at which the largest number of nerve endings are congregated. Any source of irritation within the anal canal, or at either end of it, may be the cause of the itching, and one of the first things to be done in examining a patient suffering from pruritus is thoroughly to search this area.

Local Causes.—The local causes of pruritus are the most important, and in the majority of cases some definite local cause can be found which, if treated, will cure the condition. In children, a local cause may be said always to exist, and I have never seen a case of pruritus in a child where the pruritus did not disappear after the local condition had been properly treated. The most frequent local causes in children are condylomata and worms.

One of the common causes of pruritus is a constantly damp condition of the anal skin; this is due to some leakage, which allows the rectal mucus to escape and keeps the skin at the anal margin in a constantly damp condition, or to some discharging sinus or sore. The causes of leakage are numerous. Internal piles or small polypi, by partially prolapsing into

the sphincter, cause mucus leakage, and I believe that this is the usual manner in which piles cause pruritus. Fissure, fistulæ, partial procidentia, worms, and several other conditions may be the cause of pruritus by causing leakage in a similar manner.

That leakage of moisture from the anus may cause pruritus is, I think, proved by the fact that a certain degree of temporary pruritus is not uncommonly complained of by patients during the healing stage after an operation for fistula, in which a certain amount of leakage is inevitable.

Of the causes within the rectum itself which may give rise to pruritus, one of the commonest is catarrhal proctitis; this is a cause which is frequently overlooked, owing to the surgeon being unacquainted with the proper methods of examining the rectum, or owing to his not having the proper instruments at his disposal. The commonest form of proctitis which I have observed in association with pruritus is the hypertrophic catarrhal form. This is characterized by hypertrophy and œdema of the mucous membrane, accompanied by an excessive secretion of acid mucus. There is another form of proctitis, in which the mucous membrane appears congested and granular on the surface. Both these forms of proctitis are chronic, and are usually unsuspected until an instrumental examination of the rectum is made. In both of them there is an excessive secretion of acid mucus, and it is the constant presence of this irritant material, in contact with the sensitive mucous membrane of the anal canal, which causes the itching.

I have seen several cases in which the cause of the pruritus could be definitely traced to the accumulation of this irritating mucus in the upper part of the anal canal. In one case the patient had himself discovered that this was the cause of the irritation, and was in the habit of stopping the itching by removing the mucus from his rectum. On examining this patient with the sigmoidoscope, I found that he had typical hypertrophic catarrhal proctitis, and when this was cured by suitable injections the pruritus ceased.

Glycosuria is a well-known cause of pruritus, and in all cases the patient's urine should be tested for sugar.

There are some cases of pruritus ani associated with a special tendency to perspiration around the anus and between the buttocks, and it would seem as if the pruritus in some cases resulted from the damp condition of the skin induced by the constant perspiration. At any rate, attempts to keep the parts dry and prevent perspiration seem to alleviate the itching.

I have been very much struck by the fact that a damp condition of the perianal skin is present in the great majority of cases of pruritus ani which come to me for treatment, and I am convinced that this is the exciting cause of the irritation in a very large number of cases. If this dampness can be got rid of, the irritation generally subsides.

Although the warty and rugose condition of the anal skin is the result of the pruritus rather than its cause, there is no doubt that in cases of old standing the fissures which form between the ridges on the skin have a great deal to do with keeping up the irritation; consequently, attention must be paid to getting the perianal skin back to its normal condition. This is best done by painting it occasionally with carbolic acid or with a strong solution of silver nitrate, and by the frequent application of weak carbolic fomentations.

Hypertrophied anal papillæ and small polypi are sometimes the cause of pruritus, and when present they should be removed. I am not satisfied, however, that they are at all a common cause.

A good deal of importance has been attached by some writers to reflex causes of pruritus. Such conditions as phimosis, stricture, hypertrophy of the prostate, and diseases of the female genitals have been assigned as the cause of pruritus ani, and one author goes so far as to say that gall-stones may produce pruritus. It is, I think, extremely doubtful whether pruritus can be the result of a purely reflex cause.

While the patient's general state of health must have an important bearing upon his symptoms, or at least upon their severity, I do not believe that, with the exception of diabetes, pruritus ani is directly due to other than local causes.

Examination of the Patient.—The external parts should first be examined, but one must not be misled into thinking that the obviously abnormal condition of the perianal skin is the cause of the itching. On the contrary, it is invariably the result of scratching or of applications which have been made to relieve the irritation. The anal canal itself must be most carefully examined, first with the finger and then with a *small anal speculum*. Every *portion of the mucous membrane* should be examined, and it is important to examine carefully each of the little anal pockets, or valves of Valsalva, which are to be seen just above the muco-cutaneous junction. Sometimes a minute ulcer is found at the bottom of one of these pockets, or a small fistulous track opening into one of them is discovered. The best way of examining these valve pockets is with a small bent probe. I have seen several cases in which pruritus had resulted from a small fistulous track at the bottom of one of these valves, and in which it was cured by division of the valve and laying open of the fistulous track. After the anal canal has been thoroughly searched, a short procto-scope tube should be introduced, and the upper portion of the anal canal and the lower portion of the rectum examined, and, lastly, the rectum itself should be examined up to, and above, the recto-sigmoidal junction with the electric sigmoidoscope. Of the lesions in the anal canal which may cause pruritus, the most common are fissure, a submucous fistula, ulceration in one of the anal valves mentioned above, and small polypi.

We may distinguish certain definite types of pruritus ani:

1. Those due to some general condition such as glycosuria, etc.
2. Those due to some parasite such as worms, pediculi, etc.
3. Pruritus obviously secondary to some lesion of the anal region such as fissure, prolapsed pile, etc.
4. Pruritus of old standing where no local lesion can be discovered.
5. Paroxysmal pruritus.

Most observers will, I think, agree that a local cause for the itching is present in a great majority of cases, and the first essential on seeing a case is to make a thorough and careful search for this cause. My experience has been that where a definite cause for the pruritus is discovered it is generally one which produces a certain amount of moisture of the parts, more particularly of a septic character, such as fissure or fistula, a polypus of the rectum, or a prolapsed pile.

Paroxysmal Pruritus Ani.—This is the most severe form, and is a true disease of the nerve endings. In my experience it does not result from any local lesion, nor is there any abnormality of the parts beyond what is accounted for by the scratching. The itching comes on in violent paroxysms, without cause, at any time of the day or night, and is so severe as to drive the patient nearly mad. I have known patients with this condition contemplate suicide, and one patient I had could not restrain himself from undoing his trousers and scratching himself, even if he were in a public place, when the paroxysms came on. This form of pruritus is usually the result of many years of a less severe type, and may be looked upon as a terminal condition. This condition more nearly corresponds to tic douloureux, and is undoubtedly caused by some abnormal condition of the nerve endings.

On no account should such patients be given morphia or opiates, as they may easily become morphia maniacs. Operation is the proper remedy.

Pruritus due to Parasites.—This is an important cause, and should always be looked for. *Pediculi pubis* may cause irritation in the neighbourhood of the anus, and should be noticed if a careful search is made.

A much commoner cause is the small worm known as *Oxyuris vermicularis*. This worm is often found both in children and adults. It probably gains an entrance from uncooked vegetables. It is a commoner cause of pruritus ani than is generally suspected, and can easily be missed. The worms are very small, usually not more than $\frac{1}{8}$ to $\frac{1}{4}$ inch long, and several examinations may be made without their being discovered. The patient should be instructed to look for them. If found, the best treatment is by strong salt water injections after first clearing the bowel with castor oil. This should be repeated after a few days' interval. Another method is to give sulphur tablets by the mouth, 6 to 10 grains every day for ten days.

MacArthur believes that *Enterobius vermicularis*, one of the nematode worms often found inhabiting the human intestine, is a not uncommon cause of pruritus, and that this cause may be easily missed for years. This worm's normal habitat is the appendix, and the gravid females make their way to the anus to oviposit. It is their movements which cause the irritation. The patient is constantly reinfecting himself from his fingers, which pick up the ova when scratching the parts. The itching usually occurs at night, and examination of the stools will fail to demonstrate the presence of the parasite unless a rectal wash-out, given at the time *when there is bad itching*, is examined. Even then the worms are very easily missed, and repeated examinations may be necessary before they are detected. Treatment consists in washing out the rectum *at the time when the irritation is present* (and, therefore, the female worms may be assumed to be present in the rectum) with a solution of two tablespoonfuls of salt to the pint; 4 ounces of this solution should be injected. It is also very important that the patient should not reinfect himself, and scrupulous care is necessary to secure this. Anti-worm remedies may also be administered, and of these MacArthur advises 2 grains of santonin with ½ grain of calomel.

Thymol may also be used to get rid of the worms. The treatment is carried out as follows: A good purge is first given, and next morning ½ drachm of thymol administered by mouth, followed in two hours by another similar dose. This is again followed by a good dose of salts two hours later.

Treatment.—It may be said at once that there is no royal road to the successful treatment of pruritus ani, and no method of treatment which is successful in all cases. Most, if not all, cases of pruritus can be cured if the patient is willing to place himself entirely in the hands of his medical adviser and to carry out his instructions religiously. A considerable amount of patience is, however, often required, and there may be one or two failures before success is obtained. The patient's general health should be inquired into, and a careful examination made to ascertain if there is any local cause for the condition.

General Treatment.—If the patient is somewhat over-indulgent in the matter of food, he should be placed on a strict regimen. A good, simple diet should be prescribed. Meat should be cut down, and, at the most, only allowed once a day, while all fancy and highly seasoned dishes should be forbidden. The patient should be advised to eat plenty of fruit and vegetables. If possible, it is better to stop entirely all alcoholic drinks; ginger-beer, coffee, and strong tea should also be forbidden. The bowels should be kept acting regularly with some simple aperient, or by the internal administration of petroleum.

If obtainable, a regular course of sitz baths is a good thing; or, if this is impossible, the anus should be well bathed with cold water night and

morning. It is most important that the parts should be kept scrupulously clean, and for this purpose the anus and surrounding skin should be carefully washed night and morning with a sponge and castile soap or spirit soap. The parts should be most carefully cleansed after the bowels have acted, and paper must on no account be used for the purpose. After the parts have been cleansed they should be dusted over with starch powder. Care should be taken to see that the clothes do not rub against the anal skin. I attach very great importance to scrupulous cleanliness in the treatment of many forms of pruritus ani, especially careful washing before retiring to bed.

Opium in any form should be carefully avoided in the treatment of pruritus, as there is grave danger of producing the opium habit, and it also tends to aggravate the condition.

It is important to remember that in quite a number of cases the irritation at night has become a habit, the patient waking up at the same time each night and scratching. It is most important that in addition to the treatment for the pruritus we should break this habit, and for this purpose it is advisable at first to give some reliable hypnotic to insure the patient sleeping during the period when he is in the habit of waking.

For this purpose the sleeping draught should be given every night at the same time for at least a week, and then intermittently, until the habit of regular sleep has been re-established.

While a certain amount of attention should be paid to the general treatment, at the same time it is a mistake to put the patient on too rigid a diet or to cut down all his favourite vices too extensively. After all, we are asked to cure his pruritus, and not to make him the slave to his anal region.

Local Treatment.—The obvious indication, if any definite local cause of the pruritus exists, is first of all to treat this cause. Thus if a fissure or ulcer is discovered, it should be treated by suitable means, and the same applies to internal hæmorrhoids if they are present, especially if they prolapse when the bowels act. It is a mistake, however, to operate upon one or two little hæmorrhoids which have not given rise to any symptoms merely on account of the pruritus.

Unfortunately, the removal of the cause is by no means always sufficient to cure the pruritus, though it is necessary to get rid of the cause before one can expect to treat the pruritus successfully.

There is no certain remedy for pruritus, and it is often largely a matter of guesswork to find the right one. Sometimes, after almost exhausting the pharmacopœia, one hits upon something which acts like a charm; and yet in the very next case this remedy may be useless. I recently had a patient suffering from pruritus for whom I prescribed almost every ointment and lotion I knew of, but all without giving him permanent relief,

until one day I ordered him some boracic powder. Curiously enough, this at once relieved the itching, and by using it he has entirely got rid of his trouble.

I have had much the best results from using local applications designed to keep the skin dry, and I believe that, as a rule, ointments and greasy preparations are best avoided. When, on examination, the parts round the anus are found to be damp, powders or lotions will give the best results. Carbolic acid lotion, 1 in 40, applied after washing, often gives immediate relief, and is a very popular remedy. Probably this is largely due to its acting as a local anæsthetic, but it may also be due in some cases to its antiseptic properties, for it seems probable that in some cases pruritus ani is caused by microbic infection of the skin.

Painting the skin with silver nitrate, 30 grains to the ounce, is very effective in some cases. This should be repeated at intervals of a few days.

The application of dusting-powders after carefully washing and drying the skin often gives permanent relief. The parts should first be washed with warm water and castile soap or oatmeal, then dabbed dry with a soft towel, and the powder afterwards applied with a powder-puff. The following powder I have often found very efficacious, especially when the parts were moist or cracked:

℞	Calamine powder	1 part.
	Starch powder	2 parts.

Even more effective than powders, and useful in the same type of case, are paints which leave a protective covering over the skin. These are generally made up with a glycerine basis, and should be applied with a soft brush after washing, and allowed to dry on.

The following is a good preparation:

℞	Talc	
	Starch powder	
	Dilute solution of lead subacetate	... ... Each 100
	Boric lotion, 1 per cent	
	Glycerine	40
	Camphor water	250

Another useful paint is:

℞	Picis carbonis	ʒi
	Benzol	℥iv.
	Acetone	℥ii.

This must not, however, be applied when the skin is broken, as it will cause severe smarting.

In some cases ointments seem to be the best. They should be applied

after cleansing the skin. The following are among those which I have found the most effective:

℞ Bismuthi subnitratis	ʒii.
Tinct. opii	ʒi.
Cocainæ hydrochloridum	grs. xx.
Acidi carbolici	♏v.
Acidi hydrochlorici dil.	♏xx.
Lanoline	℥ii.

℞ Bismuthi subnitratis	ʒii.
Cocaine	grs. x.
Hydrarg. subchloridi	grs. xv.
Vaseline	℥i.

Another good remedy, which should be carefully smeared over the parts after they have been bathed and then dried with cotton-wool, is the following:

℞ Acidi carbolici	ʒii.
Acidi salicylici	ʒi ss.
Sodium biborate	ʒi.
Glycerini	℥i.

This should be used at bed-time.

In some cases, especially where there is an accompanying proctitis, injections into the bowel will stop the irritation. The injections should be made after the bowels act and before retiring for the night. Three or four ounces of the solution should be injected with a bulb syringe, and retained for a few minutes.

I have found the following solutions the most efficacious:

℞ Glycothymolin	20 per cent.

℞ Extract of witch-hazel	1 ounce.
Water	2 ounces

The following is recommended by Dr. Adler:

℞ Fluid extract of hamamelis	℥i.
Fluid extract of ergot	ʒii.
Fluid extract of hydrastis	ʒii.
Compound tincture of benzoin	ʒii.

In cases of old-standing pruritus, where the skin is hard and like wash-leather, it is important to remove the thick horny layer of the skin before applying any remedy. There are several ways of doing this. One way is to paint the parts over with nitrate of silver, 60 grains to the ounce, at intervals of a day or so. Two or three applications are usually sufficient to get the skin into a more healthy condition.

Treatment of Pruritus Ani by Subcutaneous Injections.—For many years attempts have been made to cure pruritus by the use of subcutaneous injections, which would either destroy or anæsthetize the nerve endings. Harvey Stone has advised using injections of 95 per cent. alcohol. The

injections are made deep into the subcutaneous tissues, three to four drops being injected in one spot, and the whole pruritic area being injected in a series of sittings. He claims very good results for this method, the chief objection being that it occasionally causes sloughs.

Yeomans advocates the use of a solution called benacol, which consists of equal parts of para-amino-benzoyl-benzoate and phenomethylol in 90 parts of rectified sweet almond oil. A modification of this solution, which has been called A.B.A., has been advocated by Gabriel, and consists of 3 per cent. solution of anæsthesin, with benzyl alcohol 5 per cent. and ether 10 per cent., in sterilized olive oil. This solution has been extensively used at St. Mark's Hospital, and has proved of distinct value in the treatment of pruritus. Only a small area of the anal margin should be treated at one time, and not more than about 2 to 3 c.c. of the solution should be injected at one sitting. Injections can be repeated at intervals of three days to a week. The injections sometimes cause pain, but should not cause any sloughing or inflammation. It is very important that the injections should be made fairly deep, and not put immediately under the skin, or that a large amount of the solution should be injected into one place. These injections undoubtedly offer considerable relief, but in my experience the results are not very permanent.

Severe and Intractable Cases.—It has been my experience that where the itching is of recent origin the removal of the cause is followed by prompt and permanent relief of the irritation, and such cases are easily cured; but the most difficult cases are those in which no local cause can be discovered, where no application seems to do any good, and more particularly the paroxysmal cases, which drive the patient to the verge of insanity.

In considering the treatment of pruritus ani as a whole, certain definite facts seem to me to stand out. Firstly, cases of pruritus ani with a history of only a few months or weeks are easily cured by the removal of some local cause, or by some simple application. Secondly, cases of pruritus ani with a history dating back for more than two years are very difficult to cure, and the removal of the local lesion, even if present, seldom stops the itching.

From this it seems to me we have to conclude that if pruritus ani has existed in at all an aggravated form for a long time, definite changes take place in the skin, or more probably in the nerve endings in the skin, which render the condition more or less permanent and prevent effective treatment. I believe these changes to be of the nature of a fibrosis in the deeper layers of the skin and involving the nerves, more especially the end plates in the dermis, and to be caused by the constant scratching and rubbing of the parts. In fact, in these old-standing and severe cases of pruritus an actual disease of the nerve endings in the skin exists. This

was first realized by the late Sir Charles Ball, and he insisted on the fact that a definite nerve lesion was the underlying cause in such cases.

When definite changes have taken place in the nerve endings, we have to deal with a condition which is no longer likely to be cured by local applications. Nothing short of destruction of the diseased nerve endings is likely to stop the irritation. Until recently this could only be attained by total destruction of the skin, but now we can secure the same result by dividing the nerves before they reach the skin, without in any way damaging the latter, and without causing any permanent disability.

The modern operation, originally invented by Ball, of Dublin, is founded on sound principles, and has given excellent results. I believe that the reason why this operation has not been more extensively adopted than appears to be the case is that, although on paper it looks very easy, as a matter of fact it is very tricky and difficult to carry out. Unless complete anæsthesia of the whole area is obtained the result is a failure. The fact that the operation necessitates the surgeon working left-handed on one side is a difficulty which seriously handicaps some surgeons.

I have performed this operation at St. Mark's Hospital ever since 1905, with excellent results. In fact, with increasing experience of the results of this operation I find myself advising it in all bad cases of pruritus ani of more than a year's standing in which improvement has not followed local applications. It is both more certain and safer than X rays, and can be relied upon to give immediate relief.

The object of the operation is to divide all the sensory nerves to the affected area of skin. It is on the same principle as the operation for trigeminal neuralgia. It seems probable that in the worst cases of pruritus there is some disease of the nerve endings in the skin, and after the nerves are cut fresh nerve endings are formed. This seems to be the most satisfactory explanation of the beneficial results of the operation.

Ball's Operation.—The operation is performed as follows: The patient is first thoroughly prepared so as to render the rectum empty, and on the operating table the rectum is washed out with ether soap on swabs, and douched with a weak solution of monsol or lysol to render the mucous membrane as clean as possible. The patient is placed in the lithotomy position, and two curved incisions are made as shown in Fig. 113. The incisions enclose the entire ellipse of skin round the anus, leaving two narrow necks in front and behind. The flaps are now raised by careful dissection with a knife or scissors. They should contain the subcutaneous fat, but great care must be taken not to damage the muscles. As soon as one of the flaps has been partly raised tenaculum forceps are placed on the edge of it, and the surgeon works with his left forefinger inside the rectum, holding the edge of the flap by means of the forceps so that he can feel where he is cutting. The flap is raised until the external sphincter is

completely exposed on one side, and the dissection is carried up to just within the muco-cutaneous junction. The bloodvessels are clamped and twisted; it is a distinct advantage to avoid using catgut ligatures if it can be managed. The opposite flap is then raised in the same way. This has to be done with the right forefinger in the anal canal, the surgeon using his left hand for the knife or scissors. When both flaps have been raised, the pedicles in front and behind are undercut until the wounds communicate, and the surgeon now dissects carefully both in front and behind until the sphincter is completely exposed the whole way round. The nerves passing down to the skin come from above the sphincter, and can easily be missed unless the dissection is taken well up to the muco-cutaneous line; they are very small and, as a rule, cannot be seen. The skin on the outer side of the incision is now undercut for a distance of ¼ to ½ inch, and all bleeding very carefully stopped. The perineal skin inside the incisions will now be attached only by the mucous membrane above and by the pedicles in front and behind. Great care must be taken not to buttonhole the skin, as it will cause a good deal of trouble in healing. The flaps are now replaced in position and sewn up with interrupted mattress stitches of fishgut. Lastly, a long cigarette drain of rubber tissue is passed through under each flap, coming out in front and behind between the stitches. Some vaseline is squeezed into the rectum and gauze dressings are very carefully applied, beginning with a very small one and gradually increasing in size, so as to exert steady

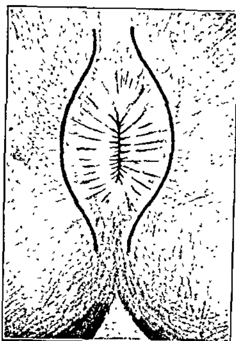


FIG. 113.—INCISIONS FOR BALL'S OPERATION.

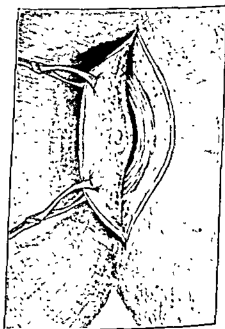


FIG. 114.—BALL'S OPERATION, SHOWING FLAP ON ONE SIDE RAISED.

pressure over the whole of the flaps. The dressings should be kept in position by means of a very firm bandage, the best for the purpose being Allingham's bandage.

The dressings are changed next day and the firm pressure reapplied. At the end of forty-eight hours the drain should be removed by cutting one end from beneath the skin and withdrawing it from the other end. Firm pressure over the flaps should be maintained for several days. I have never known the flaps slough, but the most important thing is to prevent the formation of a hæmatoma beneath the separated skin; the presence of the drains and firm pressure is the best way of securing this. The whole of the area inside the incisions should be absolutely anæsthetic when examined after the operation. If the anæsthesia is patchy or incomplete, the operation is not likely to be successful. If the dissection is taken well up to the muco-cutaneous junction, there should be no sensation at all in the skin.

The patient's bowels should be relieved by enemata on about the fifth day, and after this healing should be rapid, and should be complete in about a fortnight's time. Relief from the irritation is immediate. The anæsthesia in the skin continues for about a month to six weeks; at the end of that time it passes off fairly rapidly in the course of a few days and sensation becomes normal again, but there is no recurrence of the itching.

As an alternative to the incisions described above, some surgeons make four or more radial incisions, and undercut the skin between in the same way. Personally, I prefer Ball's original incisions, as the line of suture is thus kept farther from the anus, and is consequently less easily infected.

Moreover, one can make a more thorough dissection and be certain of dividing all the nerves both to the anal skin and to the anal canal.

This operation is not so easy as it seems from the description, as the flaps are rather complicated when raised, and their separation just within the anal canal is often rather difficult. It is important that the bowel should be very carefully prepared beforehand, and the anal canal, lower rectum, and skin thoroughly cleansed before commencing the operation. Care must be taken to keep inside the external sphincter, as otherwise this muscle or its nerve supply may easily be damaged.

I have now performed this operation considerably over one hundred times, and have been extremely pleased with the results. The proportion of recurrences has not been more than about 12 per cent., and many of these have not been for some years later, and were probably due to recrudescence of the original condition. Patients have been so pleased with the operation that, although they have had a recurrence, they have returned to have the operation repeated. The great majority of cases are completely and immediately cured, and they remain so for very many years. One of the great advantages of this operation is that it does not

leave any bad after-effects, the scars are almost invisible, and the condition of the anus is restored to normal.

Treatment by X Rays.—X rays have been extensively used in the treatment of pruritus for some years. The results in a few of these cases are very good; in probably about 20 per cent. immediate relief of the irritation results, and in a few is permanent. In the vast majority of cases it fails to give permanent relief, and even when very carefully carried out there is a serious danger of producing burns if the rays are given in sufficient dosage to have much chance of success. For some reason, which is not known, the perineum appears to be particularly liable to X-ray burns. In the past few years a number of serious X-ray burns of the anal region have resulted from this treatment, and on no account should the X rays be repeated if the first applications fail to give relief. So serious do I consider the risk of producing X-ray burns from treatment in cases of pruritus that I now never advocate it, and I believe that the patient runs far less risk, and has a greater prospect of success, by having a Ball's operation.

CHAPTER XV

RECTAL PAIN AND NEURALGIA

This is a condition in which the patient complains of rectal symptoms without there being any adequate cause to be found on examination of the parts. It is necessary, however, to be very careful in calling a case "hysteria" or "rectal neuralgia," for too often this is done because the surgeon has been unable to discover the cause, which is nevertheless present.

In the great majority of such cases there is a local lesion to account for the symptoms, but it is often very slight, and may easily be overlooked unless the examination is conducted with great care and thoroughness. In any case, the symptoms complained of by the patient are often apparently out of all proportion to the severity of the lesion.

Frequently the patients come under the term "neurotic"; they are nervous, excitable, very much afraid of being hurt, and seem to attach quite an undue amount of importance to their symptoms. The symptoms complained of are usually vague and somewhat indefinite in character. The patient often describes a number of other extraneous symptoms which a healthy man would not think of, or at any rate consider abnormal, and which are simply evidence of a morbid state of mind. Such a patient may frequently be known by the fact that he brings a long written statement with him describing his symptoms in detail. It is, however, a grave mistake for the surgeon to label such patients at once as neurotic, and to make only a cursory examination, during which he expects to find nothing. On the contrary, a most careful and painstaking examination is advisable, and will often result in the discovery of some little-suspected lesion, which, if properly treated, may make a new man of the patient. Such patients not infrequently, from long brooding upon their condition, have become a nuisance to themselves and their friends, and it is worth any effort to restore them to a healthy state of mind again.

Some of the worst cases of rectal neuralgia occur in medical men. The patient, when he is a medical man, invariably believes that he is suffering from cancer of the bowel, or that cancer will supervene upon his present condition. His medical knowledge aids him in inventing symptoms and prognosing horrors. He is often run down and overworked, and what is required is a complete change of scene and occupation rather than any local treatment.

The female type of pure neurasthenic is well known. I cannot do better than quote Macnaughton-Jones's description:

"The indolent, lethargic woman, fanciful of ailments, superficial to childishness in conversation, dull of comprehension, readily open to flattery, even to her own self a bore. . . . Sexually voluptuous, with a defective metabolism, and an abdomen loaded with fat, she becomes the registered dual property of the pure specialist for nerves on the one hand, or the expert in cotton-wool gynæcology on the other. . . . She is a source of income to the *francs-tireurs* of medicine—the ubiquitous masseuses and electricians who hover around its outposts."

The symptoms vary considerably in different cases. Sometimes the patient can give no definite symptoms, and is merely continually conscious that he has a rectum; it is hardly ever absent from his thoughts, and though no definite pain is experienced, he is always uncomfortable; or the complaint is that there is a frequent desire to go to stool, but that, on attempting to pass anything, only a little mucus, often described as looking like spittle, is passed. This is often mentioned as occurring every morning on getting out of bed, and such patients have frequently to go to stool immediately on rising, but without much result. Pain or discomfort in the pelvis is a common complaint, and some patients attach much importance to a feeling of discomfort in the testicle or "drawing up" of that organ.

Some of these patients also suffer much at times from pruritus. In other cases the complaint is of a sharp, stabbing pain, often called "intolerable," in the anus. This pain has no relation to the action of the bowels, and comes on without apparent cause. Other patients complain of a sense of fulness and discomfort, accentuated on sitting down.

In all such cases a very careful examination should be made of the rectum and colon; these patients are often hypersensitive, and the examination is difficult to carry out properly, so that it is frequently advisable to administer an anæsthetic for the purpose of examination.

Sometimes, after a most thorough examination, or repeated examinations, no cause can be found, and, in spite of the symptoms, the bowel appears to be quite healthy. In a con [illegible] number of cases, howev[illegible] a local lesion or cause can be found. [illegible]

Causes.—One or other of the followi[illegible] often present, and should always be looked for:

Proctitis or Sigmoiditis.—A mild [illegible] itis or sigmoi[illegible] frequently the cause of these sympt[illegible] will be reve[illegible] examination with the sigmoidoscope. [illegible] mmon fo[illegible] chronic [illegible] ophic proctitis, *accom*[illegible] ischarge o[illegible] gelatin[illegible] There is some thic[illegible] a of th[illegible] wall, a[illegible] eadily occurs if a h[illegible] ; this

much alarms the patient, and often results in his being repeatedly operated upon for piles by unskilled practitioners. These patients are also frequently chronic dyspeptics, or suffer from wind, and show other signs of a disordered digestion.

The following is a good instance of this condition:

Case.—The patient was a young man who for some years had been resident in the East. He had never had dysentery, but had on one or two occasions suffered from bad diarrhœa. About three years before I saw him he was laid up with pain, which came on after defæcation and lasted for many hours; he also had bleeding at stool. This continued for some time. He was repeatedly under treatment for about a year. The pain was of a dull, aching character, and continued almost all day and sometimes kept him awake at night. Later the pain became independent of any action of the bowels, and was more of the nature of a constant discomfort; he was also continually feeling a desire to go to stool, but nothing passed, and he was in no way relieved. The bowels usually acted once a day, and the stools were normal. He consulted various surgeons, and was three times operated upon during three years, but always without any relief, the operations only making him worse.

When I saw him, he was a healthy-looking man, but was quite incapacitated by the pain and discomfort from which he suffered. A careful examination under an anæsthetic revealed the presence of chronic proctitis. He was treated by rest and injections into the rectum, and in the course of about two months was quite cured of his condition. He had a slight relapse some months later, but eventually got quite well, and ceased to be aware that he possessed a rectum.

Internal Fistulæ.—A not uncommon cause of these neuralgic pains in the rectum is the presence of a small internal fistula. These fistulæ are often quite minute, and open at the bottom of one of the anal valves; they can be easily passed over, unless particularly looked for with a special bent probe. They may be discovered by the patient's complaining of acute pain when the hooked probe is passed to the bottom of one of these little anal valves. Such small fistulæ may sometimes go undetected for years, in spite of repeated examinations of the rectum. A very careful description of them is given in the late Sir Frederick Wallis's book, "Surgery of the Rectum."

Ulcers.—In the same way small ulcers covered by the anal valves, or situated at some distance up the rectum, may be the cause of rectal pains. These ulcers are sometimes very small and lie in unsuspected places—between folds of mucous membrane—so that they are not easily detected. A touch with the electric cautery is often sufficient to cure the condition.

Congestion of the Rectal Vessels.—This condition was described by Allingham, who attributed the aching and pain to pressure upon the rectal nerves from the congested vessels, and compared it to the aching felt in varix of the leg or in varicocele.

Reflex Causes.—When the rectum is quite healthy, the cause may sometimes be found in disease of the contiguous organs. In women uterine troubles or disease of the appendages is a not uncommon cause of rectal pain.

Case.—Mrs. A. B., aged fifty-nine, complained of vague pains and discomfort in the rectum and a number of other indefinable vague symptoms. Examination of the lower bowel showed it to be quite normal, but a careful examination of the uterus showed cancer of the body of this organ, and the pains disappeared after a hysterectomy.

Case.—A lady, aged forty-eight, was sent to me supposed to be suffering from cancer of the rectum. She had partial obstruction, and a large mass could be felt just inside the rectum. On examination it was discovered that the mass felt in the rectum was the fundus of the uterus. This organ was completely retroflexed and was blocking the rectum. It even partly prolapsed through the anus on straining. Removal of the uterus cured this patient.

Bladder or urethral conditions may also be the cause; or, in the male, prostatic trouble.

I have seen one or two cases in which the pain of lumbago or sciatica was referred to the rectum, and only after a careful examination was the true cause found.

Cases of True Rectal Neurosis.—Such cases are probably rare; the two most remarkable instances of this condition in my experience resulted from the war. The war was responsible in one way or another for a great number of neuroses in exaggerated form.

Case.—One of the patients was a young man, aged twenty-eight, who had served through a large part of the war as an officer, and had seen a considerable amount of fighting without having been wounded. Although he was not conscious of the fact, there was little doubt that his nerves had been seriously upset by his experiences. Eventually he was invalided home, and shortly after this he imagined that he smelt, and that the odour came from the region of his rectum. For some years before I saw him he had been living by himself and having his meals brought to him every day. He had seen various doctors, none of whom could find anything the matter, but as he was absolutely persuaded that he was quite unfit to go into society he was eventually sent to London to see me. I took him into a nursing-home and examined the rectum under an anæsthetic. There was absolutely nothing to be found the matter, and he appeared to be perfectly normal in every respect; moreover, the nurses, who were particularly asked to watch him, never noticed anything unpleasant. After a few weeks I persuaded him that he was cured, and he left the home; but some two or three weeks later he came back and told me that he had heard some people talking about the unpleasant smell in a tramcar which he was in, and a similar experience had occurred to him in a theatre, so that he had now taken to living in his room again and having his meals sent up to him. I took

the trouble to investigate both of these alleged cases as far as possible, and found no evidence to substantiate their truth. It turned out it was due entirely to his own imagination, and that these conversations had never occurred. I then called in a doctor who specialized in psycho-analysis. This doctor took a great deal of trouble with the patient, even going about in public with him, and after about three months cured him completely. It appeared that he used to hear imaginary conversations which never occurred, and there was never the slightest cause for his alleged symptoms. This patient remained well for about a year, but I then heard that he had committed suicide.

Curiously enough, a few weeks later a very hard-working business man some fifty years of age came to consult me with identical symptoms. His case also proved to be one of neurosis.

These cases lie, of course, completely outside the domain of the proctologist, and the only chance of curing them is by prolonged rest or by hypnotism. They have to be treated, however, with the greatest seriousness, as the patient may easily become suicidal, or become the inmate of a lunatic asylum.

Treatment.—It is often very difficult entirely to cure the patient if the condition has lasted a long time, as the morbid state of the mind is liable to persist after the pain has ceased.

A point of particular importance in these cases, and one which is too often overlooked, is that the patient is generally in a poorly nourished and even anæmic condition, and to feed up and fatten the patient is often of as much importance as the local treatment. The proctitis may also be treated by olive-oil injections per rectum, as recommended for ulcerative colitis. A certain, often considerable, amount of oil is absorbed by the bowel, and it is quite common to find that patients who have been for a week or two on oil injections put on a considerable amount of fat. I have, however, found petroleum by the mouth most useful to insure easy and regular action of the bowels in these cases.

In some cases a treatment by zinc ionization of the rectum will give marked relief, and this is well worth a trial if other local means fail.

Careful investigation of the cause of the pain, and treatment of this upon rational lines, is the correct procedure; but it is also necessary to prescribe for the patient quite apart from his disease. Thus a change of occupation, a prolonged holiday, or residence at the seaside are often important contributory factors in the successful treatment of these difficult cases.

True Neuralgia of the Rectum and Coccydynia.—Neuritis, or neuralgia, may occur in any nerve or group of nerves, and it is possible to get true neuritis involving the nerves passing to the rectum only, or most of the sacral nerves may be involved, so that we may have a true neuritis in-

volving the rectum or one of the sciatics, or both, and it is not uncommon to find pain in the rectum associated with sciatica. Such cases are, however, obvious, and present no particular difficulties. Difficulty arises when the neuritis is confined to those nerves passing to the rectum only. Such cases, in my experience, are very rare, but they present peculiar difficulties when they occur. The pain is referred to the rectum and anus, and is sometimes considerably worse after an action of the bowels. This is not surprising, as any activity of the parts is sure to accentuate the pain. Such patients often complain that they get very severe pain in the rectum at night, and quite apart from any action of the bowel.

A very characteristic feature of cases of neuralgia of the rectum is that the patient generally complains of acute pain coming on quite suddenly at night, often waking him up. The pain is often stated to be very severe, lasting from a few minutes to half an hour, and passing off quite suddenly.

Where the nerves are involved, a diagnosis can only be made by careful exclusion of other causes, but it may be sometimes assisted by carefully exploring the anterior surface of the coccyx and sacrum with a finger in the rectum. It will sometimes be found that on pressing ever so little somewhat to one side of the middle line acute pain is elicited; in other words, when the inflamed nerves are pressed upon severe pain results.

Sometimes definite nodules, or even small neuro-fibromata, may be felt along the nerves in this situation. These little nodules are usually extremely sensitive, and under these circumstances a diagnosis of neuritis is easily made. The following is a good example of this type of case:

Case.—A gentleman, fifty years of age, was brought to see me by his family physician with the following history: Three weeks previously he had had an acute attack of influenza accompanied by severe pain in all his nerves, and had been in bed for about a week. Towards the end of this time he began to get acute pain when his bowels acted and a constant ache in the rectum. This had persisted ever since, although he was otherwise well except for being rather run down. A most careful examination failed to show any lesion in the rectal or anal regions, but pressure from inside the rectum towards the side of the sacrum caused considerable pain. A diagnosis was made of neuritis of the sacral nerves following influenza, and he was treated by aspirin and sedatives and sent down to the seaside to recuperate. In a fortnight he was perfectly well, and has not had any pain in the rectum since.

Coccydynia.—The chief symptom of this condition is pain of a more or less severe character in the region of the coccyx. The pain is usually of a spasmodic character, and is particularly aggravated by sitting, often as a dull aching pain which may persist at night, and patients often say they are not able to sit for any length of time, so that riding in a train or a motor-car is impossible.

The condition has been ascribed to various causes. It certainly may result from an injury, such as a fracture or dislocation of the coccyx due to a fall, and in a certain proportion of cases the coccyx will be found to be deformed, or to be lacking in mobility, or there may be arthritis in the sacro-coccygeal joint, and considerable pain is caused on attempting to move the coccyx. Pain may also be due to adhesions in the joint or to inflammation of the nerves close to the side of the coccyx and fibrous tissue pressing upon or involving its nerves.

In the majority of cases no definite cause of any kind can be discovered, and the condition appears to be a true neuritis of the nerve plexuses in relation to the coccyx. The nerves passing to the coccygeal plexus are the fourth and fifth sacral, the coccygeus, and the inferior hæmorrhoidal branch of the internal pudic (probably). There are also sympathetic ganglia on the anterior surface of the coccyx. Any of these nerves may be involved in a case of coccydynia, and the acute pain which is experienced when the coccyx is injured from a fall is sufficient evidence of the free nerve supply of this region.

It need hardly be pointed out that reflex pain may be referred to this region, due to some lesion in the rectum and genitalia. In treating a case of coccydynia, it is first of all necessary to exclude the presence of any lesion. If necessary an X-ray photograph of the coccyx should be taken, but as the coccyx can quite easily be examined with the fingers, this is seldom necessary. If movement of the coccyx or pressure upon it causes pain, or the bone is itself definitely fractured, the best treatment is probably to remove the coccyx at once. This is a very simple operation, and the wound heals up fairly rapidly without any trouble.

A treatment that was originally, I believe, recommended by Dr. Yeomans is alcoholic injections. This is carried out as follows: With the patient in the Sims position, the skin over the coccyx is sterilized with iodine solution, and then with a finger in the rectum the point of tenderness is determined by pressing upon the parts between the finger inside and one's thumb outside. The point of maximum tenderness having been ascertained, a 2-inch hypodermic needle is passed through the skin to one side of the coccyx, and, guided by a finger in the rectum, is pushed along until the point is felt to be at the most tender spot. A syringe, previously filled with 80 per cent. alcohol, is then attached to the needle, and from 10 to 20 minims is injected into this spot. The pain from the injection lasts a few minutes, but a dull ache persists for twenty-four hours. A single injection will sometimes cure the patient, but most frequently several subsequent injections have to be made before a complete cure is obtained. Injections should not be made at intervals of less than seven days. I have treated several cases by alcohol injections in this way, and in some the result has been quite spectacular, the pain having completely and perma-

nently disappeared. In some cases no improvement has resulted. Everything depends upon accurately locating the affected nerve endings, which is often very difficult. I have never injected more than 10 or 12 minims of alcohol at one time, and have not seen any bad results, such as sloughing, occur. I think this treatment has a definite place in the treatment of true neuralgia of local origin.

Pain due to Disease of the Central Nervous System.—This is a most important point to investigate. Caries of the spine, locomotor ataxy, and disseminated sclerosis are all possible causes of rectal pain, and in some cases the rectal symptoms may be the earliest complained of. An examination of the spine and reflexes will assist the diagnosis.

Epilepsy.—Allingham pointed out that the aura of epilepsy may occur in the rectum, and that some of the puzzling attacks of pain in the rectum may have this cause; this may be suspected in particular if the attacks of pain occur at night. A careful investigation of the family history will be of value.

Tabes Dorsalis.—The subject of rectal crises due to locomotor ataxy is conveniently treated of here, though it is hardly correctly included in a chapter on neurasthenia. It is chiefly of interest on account of the liability to form an incorrect diagnosis, when one meets with a case probably sent up without any hint as to the presence of locomotor ataxy, and with only a history of rectal pain.

These cases are very rare, and I have only seen eight. My experience of them has been that the rectal crises occur as an early symptom, but that definite signs of tabes can be elicited, such as alteration in the knee-jerks, Argyll-Robertson pupils, difficulty in standing with the eyes shut and the feet together, and in one case loss of sensation over certain nerve areas on the outside of the forearms and legs.

The following case is a good example of this very interesting condition:

Case.—W. B., a clerk, aged fifty-two. He came to the out-patient department at St. Mark's Hospital complaining that for three months he had had pain and discomfort in the rectum and anus, and although he had seen a doctor several times he was no better. The pain was worst after defæcation, but never severe. There was a "numb feeling in the anus." For some time he had been passing urine rather frequently, and had nocturnal incontinence. On examination, the anus and rectum were apparently normal. He had Argyll-Robertson pupils, and the pupils were much contracted. There was well-marked tremor of the tongue, eyelids, and fingers, the tremor becoming more intense if his attention were drawn to it. He sometimes spilt what he was drinking. There were no knee-jerks, no ankle clonus. He swayed about, but did not fall, if he shut his eyes. There was a constant tired feeling in the legs. There was no history of syphilis, but a Wassermann reaction was positive.

CHAPTER XVI

SIMPLE TUMOURS OF THE RECTUM AND COLON

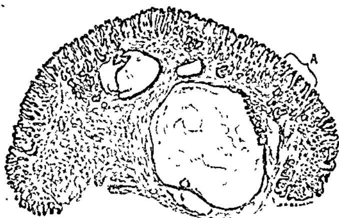
There are many different kinds of so-called innocent tumours which may be found associated with the rectum and anal opening. Some of them arise from the mucous membrane of the rectum or the skin in the neighbourhood of the anus and are of epithelial origin, while others arise from the connective tissue or from structures outside the rectal wall. These latter tumours project into the rectum and may obstruct the lumen, but are covered with normal epithelium. The commonest form of non-malignant tumour found in the rectum is adenoma, but as in my opinion the time has come when we can no longer consider adenomata as innocent tumours, they are discussed separately in the chapter on precancerous tumours (see p. 284.)

Dermoid Cysts.—Tumours of congenital origin, generally described as dermoids, are often found in the neighbourhood of the rectum, and may arise from defects of development during fœtal life of the structures round the rectum or neurenteric canal. Teratomata which are due to portions of another fœtus being incorporated in the tissue are also rarely found in this neighbourhood.

There are a considerable variety of dermoid tumours met with in connection with the rectum. They may arise from incomplete obliteration of the post-anal gut, from vestigial rests in connection with Müller's duct, or from any defect in development which results in epithelial tissue being left unconnected with the surface. The true nature of these dermoid tumours and the way in which they arise can only be determined by careful microscopic examination of the tissues after removal. The commonest form of dermoid found in this situation is the sacro-coccygeal dermoid, situated between the tip of the coccyx and the skin, and generally described as coccygeal fistula or pilonidal sinus.

Sacro-Coccygeal Dermoids.—These curious lesions cause a chronic septic fistula between the buttocks over the extremity of the coccyx. They were for a long time thought to be a special form of fistula associated with caries of the bone. They had a very bad reputation because, owing to the fact that their true nature was not recognized, they could not be made to heal. Even to-day they are the cause of considerable trouble unless a correct diagnosis is made, as, if they are treated as ordinary fistulæ and laid open, they refuse to heal, to the annoyance of the patient and exaspera-

tion of the surgeon. The condition was originally described, I believe, by J. M. Warren in 1867, but Sir John Bland-Sutton was the first person



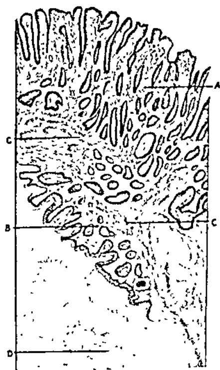


FIG. 115.—NORMAL EPITHELIAL CELLS GROWING IN THE SUBMUCOUS CONNECTIVE TISSUE AND PRODUCING CYSTS, THE RESULT OF AN OPERATION SEVEN YEARS BEFORE

The lower picture shows the appearance under a high power of the part marked A in the upper figure. C, Connective tissue, B, epithelium lining cyst; D, interior of cyst

to realize their true significance. I gave a complete description of them in 1921.

They are congenital remnants of the faulty coalescence of the cutaneous

covering of the skin over the coccyx during early embryonic life. Bland-Sutton believes them to be an exaggeration of the post-anal dimple often seen in this situation. They are really sequestration dermoids due to skin having been shut off from the external surface during development. A small cyst forms opposite the tip of the coccyx deep to the skin and gradually enlarges. The patient may live for many years without the condition causing any trouble. As a rule the history is that, as the result of a blow or some slight injury, an abscess forms and bursts on the surface. I have never seen one of these cases where a fistulous track to the outside had not already occurred, and it is probable that they do not produce any symptoms until this has happened. It is a curious fact that these lesions

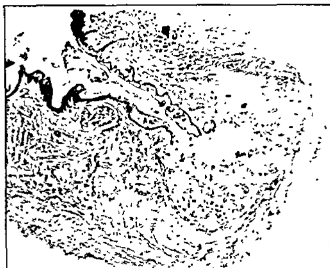


FIG. 116.—SACRO-COCCYGEAL FISTULA.

Termination of a sacro-coccygeal fistula, showing the first part of the track lined by stratified epithelium. This leads into a deeper infected portion occupied by hairs and granulation tissue.

may exist for very many years without causing any serious trouble and without the patient being conscious of them. I have never seen one in a child, though if the condition is congenital it must have been present since birth.

There are generally several small openings, always situated just over or close to the tip of the coccyx, and discharging either pus or thin serous fluid. The parts round are tender and often inflamed, and tracks may have formed into the buttocks on either side. The condition causes the patient considerable discomfort when sitting, and if an abscess is forming is acutely painful.

One generally finds that several operations have already been unsuccessfully performed with the object of curing the condition. The fistulous

tracks are lined with skin, and it is for this reason that they will not heal up when laid open. Sometimes there is a definite cyst, and in one case I removed a cyst as large as a pigeon's egg. There are usually hairs growing from the side of the tracks, and on several occasions quite large locks of hair have been found. The condition can often be diagnosed from the fact that hairs can be seen protruding from the orifice of the fistula.

Fig. 117 shows the appearances seen on microscopical examination of a cross-section of one of these fistulous tracks. There is often a considerable deposit of fibrous tissue round the fistula as the result of old suppuration.

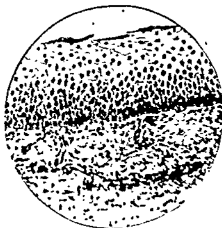


FIG. 117.—HIGH-POWER VIEW OF EPITHELIAL WALL OF FISTULA.

There is only one way of curing these lesions—namely, by completely cutting out the whole of the dermoid cyst. In order to perform this successfully an elliptical piece of skin, which includes all the tracks, should be removed, together with all the tissues right down to the fascia covering the coccyx. There is no necessity to remove the coccyx, as the cyst is always superficial to it. After all the tracks lined with epithelial tissue are completely removed healing will occur quite readily.

When there is not much suppuration present, the wound should be drawn together with deep traction sutures and the skin sewn up. Quite a number of cases have healed up by first intention, with, of course, considerable saving of time to the patient. When there is much suppuration, however, it is better to leave the wound open and allow it to heal up from the bottom by third intention.

Post-Rectal Dermoid Cysts.—Another form of dermoid is often called a post-rectal dermoid, and arises in the tissues behind the rectum, and between it and the sacrum. These tumours are lined with skin, and contain sebaceous matter and occasionally hair. They may reach a very considerable size. The largest I have seen contained about 1 pint of fluid. The patient was an elderly lady, and some four years before a surgeon had opened the cyst, believing that it was an abscess, and drained it, with the result that violent suppuration had occurred and continued ever since. The cyst filled the whole of the posterior part of the pelvis and overlapped the rectum on each side. Its removal was a matter of the very greatest difficulty.

I have had to remove several of these cysts, and they all caused great

difficulty. They generally occur as more or less spherical elastic swellings, situated behind the rectum and pushing the latter forward. On one occasion I removed a tumour about the size of a duck's egg from behind the rectum in a man of forty-three. On opening the cyst it was found to be lined with ciliated epithelium and filled with clear gelatinous fluid. It must have arisen from a remnant of the central canal of the spinal cord. Keene also removed a tumour lined with ciliated epithelium in this neighbourhood.

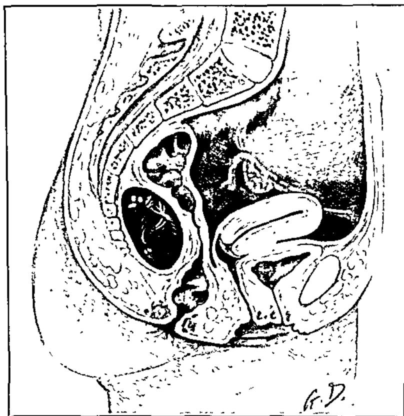


FIG. 118.—DERMOID CYST BEHIND THE RECTUM.

Cysts lined with cells resembling the glioma cells of the brain and spinal cord are sometimes found in this situation. I removed one cyst of this nature in St. Mark's Hospital in 1921, and Kimpton has reported a similar case.

Occasionally dermoid cysts are found in the recto-vesical septum behind the bladder, and also occasionally a dermoid occurs in the rectum itself. The most famous case of this kind is that recorded by Clutton in 1886, which was removed from a girl nine years of age. The tumour was attached by a double pedicle to the recto-sigmoidal junction, and was

removed through the anus. It was covered with skin, and there were long locks of hair growing from it. A somewhat similar case has been reported by Post. In his case there was bone and well-developed teeth in the cyst, so that probably the tumour was really a teratoma.

Sequestration dermoids of the mucous membrane of the rectum may occur, but appear to be very rare, as at present I have been unable to find more than two recorded cases of this condition. There is a beautiful specimen in St. Mark's Hospital Museum of a cyst lined with bowel epithelium which I removed from a lady, who seven years previously had had an operation for removal of part of the rectum. There were several cysts all situated deep in the connective tissue and lined with normal bowel epithelium. These cysts were removed, and five years later this lady developed three more similar cysts (see Fig. 115.)

Treatment.—Dermoid cysts, when discovered, should always be completely removed, as they are bound to give rise to serious trouble in course of time. They gradually increase in size until they either burst and suppurate, or press upon the rectum so as to cause obstruction. These dermoid cysts suppurate very violently once the contents become infected. For that reason it is important that they should not be drained, but should be completely removed in one piece. On no account must any portion of the wall of the cyst be left behind, or a new cyst will form in course of time. When the cysts are not very large they can be dissected out whole, and as a rule, if no suppuration has taken place, once the line of cleavage has been found, they can be shelled out with a finger. On no account should one of these cysts be drained. Unfortunately they are sometimes mistaken for an abscess and drained before the diagnosis is made. When the cyst has suppurated the walls will have become more or less densely adherent to surrounding tissues, and considerable difficulty will be found in removing it. The easiest way of removing a large dermoid cyst, or one which is densely adherent from old suppuration, is to open it and work with the left forefinger, or two fingers, within the cyst, using the right hand for dissecting it away from the surrounding tissue. It will often be necessary to remove the coccyx in order to get free access where there is a large cyst.

Fibromata.—These are usually met with in the shape of polypi, and generally have a long narrow pedicle. They most commonly arise from internal piles which have been present for some considerable time, or in connection with some chronic inflammatory condition of the bowel. The probable course of events is that at some period or another an internal pile becomes thrombosed, and fibroid changes take place in it; this fibroid change becomes progressive, and gradually a fibroid tumour is produced growing from the pile. In many cases of prolapsing piles of old standing one or other of the piles will be found to have become converted into a

fibrous polypus. An illustration of such a case is given in Fig. 119. Sometimes these fibromata reach a very considerable size. They are easily removed, either by ligature or by crushing the pedicle and cutting them off, and do not tend to recur.

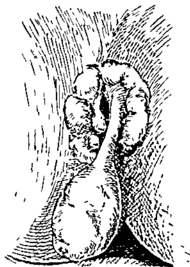


FIG. 119.—LARGE FIBROUS POLYPUS ARISING FROM A NEGLECTED INTERNAL PILE.

Myomata.—These tumours arise in the muscular coat of the bowel, and correspond to myomata found in the uterus. The amount of fibrous tissue in them varies considerably, and they are classified as myomas, fibro-myomas, and myo-fibromas, according to the amount of fibrous tissue and muscle they contain. In one case of my own bony granules were present, so that the tissues had undergone partial calcification.

Some of the tumours are almost indistinguishable on microscopical examination from round-celled sarcomata.

They occur both singly and as multiple tumours, and may be pedunculated or non-pedunculated. They vary in size from masses the size of a walnut to tumours weighing as much as 12 pounds.

Symptoms are generally due to some mechanical cause, such as blocking of the rectal lumen, pressure upon nerves, or hæmorrhage, the result of erosion of the mucosa. The predominating symptoms in twenty cases were constipation, hæmorrhage, and pain.

As a rule the mucous membrane over these tumours is unaltered, and it is chiefly by this means that they can be distinguished from malignant tumours, which, with the exception of sarcomata, are practically always accompanied by marked ulceration. They have to be distinguished from gummata, which they somewhat closely resemble.

These tumours grow exceedingly slowly, and may last for many years without giving rise to any serious symptoms. The condition is slightly more common in females than males; thus, out of twenty cases reported in the Mayo Clinic, thirteen were females and seven males. The youngest patient was twenty-one, and the oldest eighty-five. The following table gives the ages by decades:

	Cases.
21-30	2
31-40	6
41-50	10
51-60	3
Over 60	2

Treatment.—The exact method of removing these tumours must depend upon their extent and the part of the bowel wall involved, but if a free removal is made the prognosis should be good. In several instances the tumour has had to be removed per abdomen, owing to its large size. Often the only possible method of removing the tumour is to remove the rectum completely.

Adeno-Myomata.—These curious tumours are believed to be due to endometrial tissue escaping from the open ends of the Fallopian tubes and forming transplants on the peritoneum. The exact etiology of this condition cannot be said to be definitely established as yet, but the condition is well known to gynæcologists. It is generally accompanied by the appearance of chocolate cysts in one or both ovaries. Transplants may occur on any part of the peritoneum, the most common positions being in the neighbourhood of the umbilicus and bottom of Douglas's pouch. The condition may be found as a single tumour involving the rectum, but more frequently as multiple tumours. It has to be borne in mind that these tumours originate on the peritoneal aspect and involve the rectum secondarily. They start in some part of Douglas's pouch and invade the rectal wall. They are firm, elastic tumours, and the mucous membrane covering them is not ulcerated and generally normal. Careful examination will reveal the fact that they are in the muscular wall of the rectum and the vaginal vault. The tumours may reach a very considerable size and cause obstruction. These tumours often enlarge in size rather rapidly *during menstrual periods, and it has been supposed* that they only grow at these times.

The diagnosis is difficult unless a microscopical examination can be made. The microscopic appearances are characteristic. The condition must be looked upon as semi-malignant. Sir Charles Gordon-Watson reported a case of this nature in which the tumour behaved like a sarcoma and recurred in various parts of the body after removal. A malignant change in one of these tumours has also been reported by Hunt. Quite a number of these curious tumours have been collected in recent years.

Treatment.—This is often a matter of considerable difficulty. Very frequently the tumours involve the uterus and the peritoneum between it and the rectum, and removal of the tumour is fraught with considerable risk; it is only occasionally that satisfactory removal can be carried out. As a rule they behave as innocent tumours, and if completely removed do not recur.

The following case well *illustrates the condition:*

Case.—A lady, aged thirty-four, who had three large tumours in the rectum which were causing obstruction and a considerable amount of pain. The condition was first thought to be malignant disease. The

only method of removing the growths was by means of abdomino-perineal excision. I removed the whole of the rectum and part of the sigmoid flexure by this route; established a permanent colostomy opening. The patient made an excellent recovery, and no recurrence had occurred six years later. On examination of the specimen it was found that there were three large tumours in the muscular wall of the rectum at its junction with the sigmoid. The mucous membrane over them was not ulcerated, but there was considerable contraction of the bowel wall, so much so that the peritoneum overlying the tumours was deeply puckered. Sections of the tumours show them to be fibro-myomata undergoing calcareous change, and the appearance suggested that one, at any rate, had spread from the uterine muscle via the left posterior uterine ligament. The largest tumour was the size of a tangerine orange.

There are several methods of treating these tumours. One of them is by complete double oöphorectomy in the view that the endometrial tissue ceases to proliferate in the absence of the ovaries and the tumour disappears. On one occasion I performed this operation on a woman of twenty-nine. I was able to watch this patient for some years afterwards, and the tumour ceased to grow and all the symptoms subsided.

The use of radium has also been suggested for treating these tumours, but I have no personal experience of the results.

Angiomata of the Rectum.—This is a very rare condition, and it is, of course, congenital. The following case, which came under my own observation, is fairly typical:

Case.—The patient was a man, aged forty-one, who had just recovered from a severe rectal hæmorrhage, which had left him very anæmic. The history was that he had first had a rectal hæmorrhage when nineteen years of age, and on several occasions since had suddenly had alarming and serious hæmorrhages which had threatened his life. The usual sequence of events was that he got suddenly collapsed, then his bowels acted, and he passed a huge mass of blood-clot. It had been supposed that he had a duodenal ulcer.

An examination of the rectum with the sigmoidoscope showed that most of the wall of the rectum and part of the lower portion of the sigmoid flexure of the colon consisted of a large venous angioma, with great veins as large as one's little finger. The hæmorrhages were probably due to the bursting of one of these veins. Surgical treatment of the condition was obviously impossible, and I advised him to live a very temperate life, to avoid high blood-pressure, and when a hæmorrhage occurred, to take to his bed at once and have the bowel douched out with lukewarm water and hazeline. With this treatment he continued for nine years, having only one attack of hæmorrhage during that time. He then had three severe hæmorrhages in the course of four days, and was reduced to such a condition of anæmia that it seemed impossible he could recover. When I was sent for to see him, the bowel was washed out with kaolin and water, saline was administered into the axillæ, the

bottom of the bed was well raised, and everything was done to combat the condition of shock. He slowly began to pull round, and seemed to be going to recover, but five days later another severe hæmorrhage occurred, which proved uncontrollable, and he died.

Dr. Bensaude, of Paris, who saw this case with me, showed me the drawings of another case almost exactly similar, except that the patient was a girl of sixteen. In this case also the angioma was venous, and involved both the rectum and part of the sigmoid flexure.

The symptom which generally first calls attention to the condition is severe hæmorrhage. An examination with the sigmoidoscope shows a



FIG. 120.—SIGMOIDOSCOPIC APPEARANCE OF THE RECTUM IN A CASE OF CAVERNOUS ANGIOMA.
(From R. Bensaude, "Traité d'Endoscopie.")

large mass covered with great bloodvessels, of which some are large veins and others bright red arterioles. Some of the vessels may be as large as the tip of one's little finger. The vessels can be seen pulsating, and there is no difficulty about making a diagnosis. Some of these cases have been described as cirsoid aneurysms of the rectum. The appearance, as seen with the sigmoidoscope, is shown in Fig. 120.

Dr. Bensaude has collected fourteen cases, including my case, and gives a very full description of the condition in a paper, to which the reader is referred for further details.

Treatment.—Little can be done in these cases, as a rule, beyond treating them for hæmorrhage. It is often a difficult matter, and consists of washing out the rectum with a styptic solution, such as hazeline, and very careful packing. If the bleeding area is within reach, the packing should be very

too great for there to be any reasonable probability of successful removal. The feeding vessels are large, and uncontrolled bleeding may easily occur.

Out of Dr. Bensaude's fourteen cases, five died of hæmorrhage, three were successfully operated upon, two died as the result of operation, and one operation was unsuccessful in curing the condition. Three cases were treated with radiotherapy and cauterization, but Dr. Bensaude came to the conclusion that operative surgery offered the only chances of

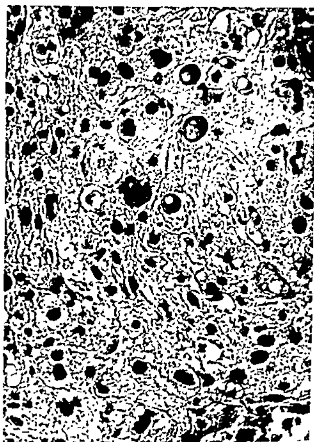


Fig. 122.—Section of Chordoma.
(Kindly loaned by Professor M. J. Stewart.)

a satisfactory result. Two of his patients had angiomata in other parts of the body as well as in the rectum.

Sacro-Coccygeal Chordoma.—These very rare tumours are occasionally found in the sacro-coccygeal region. The tumour consists of notochord-like tissue showing large cells with clear jelly-like contents. The tumour is encapsuled and feels like a cyst. It sometimes attains a considerable size, and the largest recorded is said to have weighed 13 pounds.

Dr. Stewart, of New York, collected a total of sixty-three of these cases

from the literature. The tumours grow in the front surface of the sacrum, or just in front of the sacro-coccygeal joint. They are said to occur only in the midline of the sacrum. These tumours can be equally classified either as malignant or innocent, as they appear to belong to that curious type of tumour which is sometimes quite innocent, and at other times is typically malignant. In the malignant cases the metastases are spread by the lymphatics, and in this way it resembles cancer.

Professor Matthew Stewart has given the best description of this condition. He says that the tumour arises from relics of the notochord, and that it may occur either as a simple or a malignant tumour (see Fig. 122).

A case which was under the care of Sir Charles Gordon-Watson recurred after removal on several occasions. Another case which I operated upon in St. Mark's Hospital has not recurred in five years after removal, and appears to be behaving as an innocent tumour.

Treatment.—The only treatment would appear to be by removal of the tumour. The operation may prove extremely difficult, owing to the fact that it is situated partly within the front part of the sacrum, and its removal from this position necessitates gouging it out of the bone.



Fig. 123 — Lipoma of Rectum.

Lipomata.—These tumours may occur anywhere, either on the skin or in the wall of the rectum, and they are sometimes found in the colon. Fig. 123 shows a typical lipomata which occurred as a rectal polyp. It is well to remember when dealing with large fatty tumours of the rectum that they have arisen from the adipose tissue from the outside of the bowel and beneath the peritoneum, and not infrequently they have a prolongation of peritoneum into the pedicle. Their removal may, therefore, result in opening the peritoneal cavity, and for this reason it is better to remove them by ligature than with a snare or cautery.

Lymph-Angiomata.—These are very rare tumours consisting of honeycombed spaces lined with endothelial cells mixed up with many arteries and dilated veins. Chisholm describes a case of this condition where the patient, a woman aged thirty-eight, had a tumour in the right posterior

quadrant of the rectum. It was about the size of a walnut, and felt soft and cystic. It bled on examination.

Lymphomata.—There are a number of different tumours which may be found in the region of the rectum composed of lymphoid tissue. Some of them would appear to be malignant, but the majority are certainly innocent tumours. The malignant tumours are generally classed as lympho-sarcomata.

Several of these tumours have been removed at St. Mark's Hospital, and the museum contains several specimens. One of the most remarkable

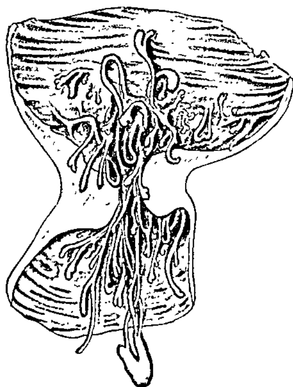


Fig. 124.—Drawing of a Specimen in St. Bartholomew's Hospital Museum, showing a Simple Fibrous Stricture in the Centre of the Transverse Colon and Numerous Filiform Polypi growing from the Mucous Membrane above the Stricture

The colon above the stricture is dilated.

was removed by my colleague, Gabriel, from the rectum of a man aged thirty-three. It was a pedunculated tumour, and was apparently growing from the submucous tissue. It was composed entirely of lymphoid tissue. After removal it showed no tendency to recur, and the patient has remained well since.

Polypi in Association with Hyperplastic Tuberculosis.—These are also described in dealing with tubercle of the colon. They occur in or just above the stricture. They may contain giant cells and tubercle

bacilli. They may be present in considerable numbers and have long pedicles.

Polypi in Association with an Old Stricture.—These polypi are very curious. They are filiform structures, often of most curious and eccentric shapes, and several inches long. They are often looped or fork-shaped. They are in appearance quite unlike the polypi previouly described, and are only found in and just above and below an old simple stricture (see Fig. 124). They consist of connective tissue covered by mucous membrane.

Polypoid Condition associated with Ulcerative Colitis.—These are not true polypi, though their appearance is very similar, but are the islands

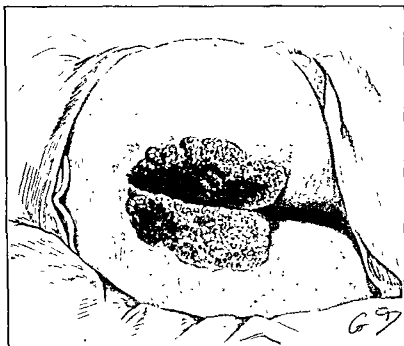


Fig. 125—Anal Wart.

of mucous membrane left between the ulcerated areas. Each of these becomes partly undermined by the ulceration, and thus a pedicle is formed. The mucous membrane becomes swollen and hypertrophied, and in this way the appearance of a polypus is produced (see page 465).

Anal Warts.—There are two varieties of anal warts. The most usual type shows thin, whitish-coloured, branching warts just round the anal orifice and just within it. They grow from the skin, and may be present in enormous numbers, varying from minute spots to branching processes ¼ inch long, something like seaweed to look at. They may spread on to the skin for an inch or more from the anal margin. They cause a good deal of irritation and a certain amount of discharge. They used to be

considered secondary to gonorrheal proctitis, although I have never seen them in this connection. They occur with any kind of chronic irritation in the neighbourhood of the anus, and in young people are associated with dampness. They are sometimes found associated with secondary syphilis, and are very often seen in association with worms.

A rare form of wart found in the anus is sometimes seen where the warts are reddish, sessile bodies, more like papillomata. This condition is frequently mistaken for epithelioma of the anus; in fact, all the cases I have observed have been so diagnosed to begin with. Some of these warts may grow to a very considerable size, as in the case illustrated in Fig. 125. The patient in this case was a young soldier, who was sent to me because he was supposed to be suffering from epithelioma. The warts covered an area as large as a small plate, but they were simply warts, and he eventually made a perfect recovery.

A microscopic examination of one of the warts will, of course, immediately establish the diagnosis. The fact, however, that there is no ulcerated surface and that the glands are not involved should be sufficient to distinguish them from malignant disease.

Treatment.—The best way of treating anal warts is to first of all remove them thoroughly with a pair of scissors, if necessary under an anæsthetic, and to cauterize the base of the warts with fuming nitric acid. Of course, if the warts are very extensive, one area only must be done at a sitting. The patient should then be seen at weekly intervals, and any warts that are still present touched with fuming nitric acid on the end of a match. This is a very effective way of getting rid of them, but the patient should be watched for some weeks to make sure that all the warts have disappeared. Dusting them over with calomel powder or rubbing with copper sulphate crystals will also sometimes get rid of them.

Although I have tried X rays in these cases, it does not seem to be of any use, and I notice that other authors are of the same opinion.

Hypertrophied Anal Papillæ.—At the junction of the skin and mucous membrane just within the anus there is a fine fringe which marks the junction of the hind-gut with the proctodeum, and is found immediately below the valves of Morgagni. Occasionally the edges of this fringe become hypertrophied and form definite papillæ. An illustration of this condition is found in Fig. 126. There are generally five of these papillæ to be found in the rectum, though they are not always seen. At St. Mark's Hospital fifty consecutive patients were examined for these papillæ, and they were found to be present in twelve, or 24 per cent. Any one, or all, of these papillæ may be found hypertrophied. They sometimes reach quite a considerable size, measuring ½ inch in length, and consist of solid fibrous tissue. Why these papillæ should sometimes become hypertrophied it is very difficult to say. When large, they can be felt with the finger, but

they are best examined with a short tubular speculum, such as the or illustrated in Fig. 15, p. 32. As this is withdrawn, the little papill will be seen very clearly. When they are hypertrophied, they ofte become exceedingly sensitive, and appear to be highly endowed with nerve endings. In some cases they undoubtedly produce discomfort, or even neuralgia in the bowel. It has often been thought that these papillæ, when present, are the cause of pruritus. I have not been able to satisfy myself that this is so, but certainly in some cases the removal of the hypertrophied papillæ has appeared to result in a cure of the pruritus. They can be removed quite easily, either by crushing with forceps or by means of a galvanic cautery. It must be remembered, however, that they are usually highly sensitive structures, and that an anæsthetic will be advisable. The bleeding that results from their removal is qu negligible.

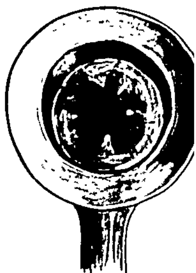


FIG. 126.—HYPERTROPHIED AN PAPILLÆ, AS SEEN THROU TUBULAR SPECULUM.

Pigmentation of the Mucous Membrane.—This is in no sense a tumo and it is only mentioned here as a rare condition sometimes met with the rectum and colon. The mucous membrane seems to be pigment either in patches, or sometimes it is quite black like the roof of a do mouth. The condition is not very uncommon. It has no particu significance, and all authorities are agreed that it is not associated w any symptoms. The condition was very carefully described by Ba as long ago as 1913, and several papers describing various cases of condition have been published since. In one case where the entire co was pigmented the patient was suffering from lead poisoning, and it found that the black coloration was due to sulphate of lead deposi in the mucous membrane. In most cases granules, which give a react for iron, are discovered in the mucous membrane. Most of those who h investigated the condition agree that a definite iron reaction is pre and they believe that the pigment is of hæmatogenous origin. It appe that the iron in most cases is derived from blood-corpuscles, pr due to their breaking down and releasing hæmin, which becomes depo in the form of granules. It has been suggested that iron may b deposited in the mucous membrane as the result of it being administ through the mouth in the form of medicine, or from iron prese

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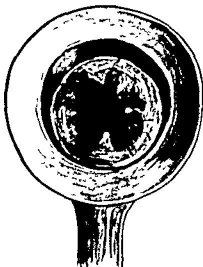


FIG. 126.—HYPERTROPHIED ANAL PAPILLÆ, AS SEEN THROUGH TUBULAR SPECULUM.

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bread from the use of roller-mills in grinding corn. It has also been suggested that the deposit is melanin, though this seems doubtful. It is evident from the number of observations made that the discoloration may result from mineral salts deposited in the tissues and secreted by the mucous membrane, but that in most cases it results from the breaking down of blood-corpuscles. While it is a remarkable curiosity, it does not appear to be of any pathological importance.

Simple Tumours of the Colon.

Simple tumours are not very common in the colon. Fibrous tumours, the result of diverticula and pericolitis, and hyperplastic tuberculosis, are sometimes found, and will be found referred to under these headings. These fibrous tumours, however, are inflammatory in origin, and not true tumours. Lipomata are occasionally found in connection with the colon; but they are rare, and seldom cause symptoms unless of very large size.

I recently operated upon a gentleman for chronic obstruction due to a tumour in the pelvic colon, and resected the tumour together with 4 inches of the colon, and performed an end-to-end anastomosis. On examination the tumour proved to be a submucous lipoma about the size of a golf ball. The patient made a perfect recovery. A similar case has been recorded by Norbury. Lipomata outside the muscle coat of the colon do not as a rule cause symptoms unless very large, but those within the lumen cause obstruction.

Villous adenomata occur in the colon; but they are seldom detected before they have become malignant. In most cases, when removed, they are found to show well-marked malignant changes, and are therefore usually classified as malignant tumours. Single polypi are occasionally met with, and are a well-known cause of intussusception; their structure is usually adenomatous, and they have a long pedicle produced by the action of peristalsis in attempting to move them along the bowel lumen.

Since the routine use of the sigmoidoscope for diagnosis, simple adenomata of the colon have occasionally been detected.

For a complete description of adenomata of the colon the reader is referred to the next chapter, on precancerous conditions. When found they should always be removed, as they are definitely precancerous. It has been my practice to always remove adenomata, however small, whenever they are detected.

Adenomata that are discovered in the pelvic colon by means of the sigmoidoscope can be removed by means of a snare or diathermy snare through the instrument. This procedure, while very satisfactory, is not at all safe. There is often a small dimple of peritoneum drawn into the

pedicle, and the snaring off of the polyp may result in a hole through the bowel wall into the peritoneal cavity. This occurred to me on one occasion.

Case.—The patient was a lady with an adenomatous polyp about the size of a cherry in the pelvic colon 15 cm. from the anus. I snared it off with a diathermy snare, being very careful not to damage the colon wall. Next day she developed symptoms of pelvic peritonitis, and I opened the abdomen. I then found a small hole about the size of a lead pencil in the colon wall. This was sewn up and the pelvis drained. Fortunately the patient made a good recovery.

Since that experience I have not attempted to remove large polyps from the colon by means of a snare. I think it is much safer to open the abdomen and remove them through an incision in the colon

bread from the use of roller-mills in grinding corn. It has also been suggested that the deposit is melanin, though this seems doubtful. It is evident from the number of observations made that the discoloration may result from mineral salts deposited in the tissues and secreted by the mucous membrane, but that in most cases it results from the breaking down of blood-corpuscles. While it is a remarkable curiosity, it does not appear to be of any pathological importance.

Simple Tumours of the Colon.

Simple tumours are not very common in the colon. Fibrous tumours, the result of diverticula and pericolitis, and hyperplastic tuberculosis, are sometimes found, and will be found referred to under these headings. These fibrous tumours, however, are inflammatory in origin, and not true tumours. Lipomata are occasionally found in connection with the colon; but they are rare, and seldom cause symptoms unless of very large size.

I recently operated upon a gentleman for chronic obstruction due to a tumour in the pelvic colon, and resected the tumour together with 4 inches of the colon, and performed an end-to-end anastomosis. On examination the tumour proved to be a submucous lipoma about the size of a golf ball. The patient made a perfect recovery. A similar case has been recorded by Norbury. Lipomata outside the muscle coat of the colon do not as a rule cause symptoms unless very large, but those within the lumen cause obstruction.

Villous adenomata occur in the colon; but they are seldom detected before they have become malignant. In most cases, when removed, they are found to show well-marked malignant changes, and are therefore usually classified as malignant tumours. Single polypi are occasionally met with, and are a well-known cause of intussusception; their structure is usually adenomatous, and they have a long pedicle produced by the action of peristalsis in attempting to move them along the bowel lumen.

Since the routine use of the sigmoidoscope for diagnosis, simple adenomata of the colon have occasionally been detected.

For a complete description of adenomata of the colon the reader is referred to the next chapter, on precancerous conditions. When found they should always be removed, as they are definitely precancerous. It has been my practice to always remove adenomata, however small, whenever they are detected.

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CHAPTER XVII

PRECANCEROUS CONDITIONS

DURING the last few years considerable attention has been paid to those conditions of the rectum which are found to predispose to the formation of cancer of that organ. It may be confidently asserted that cancer does not occur in a perfectly healthy rectum, and that there is good reason to believe that an abnormal condition of the tissues always supervenes before the onset of malignancy. In view of the fact that our present means



FIG. 127.—ILLUSTRATING THE MICROSCOPIC APPEARANCE OF A SECTION SHOWING LOCAL HYPERPLASIA OF THE MUCOUS MEMBRANE OF THE RECTUM.
The epithelial proliferation is not yet visible to the naked eye.

of treating cancer of the rectum, even under the best circumstances, are none too successful, and that the prospects of being able to improve upon those means to any large extent are not very hopeful, it is proportionally necessary that we should pay close attention to those conditions which from experience we have found to be the precursors of cancer, so that we can deal with them at a stage when treatment is really effectual. It is



FIG 128.—LOCAL HYPERPLASIA LEADING TO ADENOMA.
This degree of epithelial proliferation reveals itself as minute, rounded elevations on the surface of the bowel, just visible to the naked eye.

much easier and much more profitable to remove a precancerous condition than to remove a cancer after it has eventuated. I believe that cancer only occurs in persons who have inherited a genetic susceptibility to mutation of the cells in certain tissues, but this susceptibility is to hyperplasia of the cells, and the earliest stage is not cancer, but only excessive proliferation of the cells in a certain tissue. It follows that if we can detect this

change in the tissue and deal with it, we can prevent the patient from developing a cancer.

In most books adenomata of the bowel are classed as innocent tumours, but, as I shall try to prove, they are only innocent in the sense that they are not cancer; they are in reality the early stage of cancer, and will in a large percentage of cases ultimately become malignant. For that reason I have not described them under innocent tumours, but in a class by themselves as precancerous tumours.



FIG. 129.—ADENOMA OF THE RECTUM: ONE OF MANY TUMOURS FOUND SCATTERED OVER THE MUCOUS MEMBRANE OF THE RECTUM IN A CASE OF EARLY CANCER.

The following description, which is taken from an article written by Cuthbert Dukes and *myself*, describes what I believe to be the sequence of events in the life-history of an adenoma.

If it were possible to preserve a record of the condition of the mucous membrane of the rectum for several years before the appearance of a malignant tumour, I believe that in the majority of cases the following stages would be noticed in sequence, though naturally the number of years elapsing between each stage would vary greatly from patient to patient: *First stage:* Localized patches of hyperplasia invisible to the naked eye, but discoverable with the microscope, affecting an extensive area of the bowel (Fig. 127). *Second stage:* The appearance of a crop of sessile adenomata scattered over as wide an area as was affected by the initial hyperplasia (Figs. 128 and 129). *Third stage:* The development of cancer, either in one of hese pre-existing adenomata (Fig. 130) or in the neighbouring epithelium.



FIG 130.—MALIGNANT DISEASE COMMENCING IN ADENOMA OF THE RECTAL MUCOUS MEMBRANE.

The malignant change is limited to the top and one side of this tumour, but cancer cells are to be seen also invading the submucosa (indicated by the arrows)

In another variety of the same condition the tumour is more nodular in character, though it still retains its soft feeling when examined by the finger. This variety, however, does not tend to bleed so readily as the true villous growths.

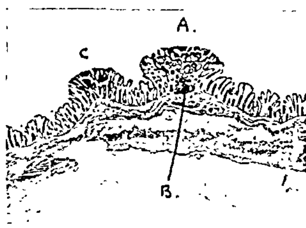


FIG. 132.—PHOTOGRAPH OF THE VERY EARLY STAGE IN THE FORMATION OF ADENOMATA OF THE COLON.

Two adenomata, A and C; B, collection of lymphocytes in the base of A.

As soon as the tumour reaches any size it acts as a foreign body in the rectum. The rectum naturally tries to get rid of it, and the constant

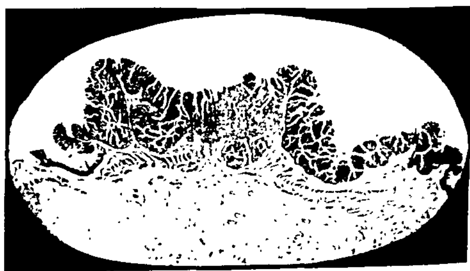


FIG. 133.—TUMOUR OF THE RECTUM, PART OF WHICH IS MALIGNANT AND PART INNOCENT.

The central portion is malignant.

dragging effect produced by efforts to evacuate the tumour tends to drag down the mucous membrane to which the growth is attached. As a result, in many cases the tumour after a time gets a pedicle of normal

mucous membrane, and not infrequently a definite prolapse of the entire rectum is produced with the tumour at its apex.

The smaller villous growths do not produce many symptoms, an increase in the amount of mucus in the stools and occasional bleeding being the only symptoms which indicate their presence.

When an adenoma is examined microscopically in fixed sections it will be seen that it consists of perfectly normal cells arranged in an orderly manner in relation to each other. In appearance the cells do not differ from those of normal mucous membrane except that they are piled up in the form of a tumour, and that they form an excrescence upon the normal tissue of which they form a part. There is a very marked tendency for all adenomata at some time or another to become malignant. All those who have studied these tumours are agreed as to this tendency, though some attach more importance to it than others. So marked is this tendency for simple adenomata to become malignant, that personally I look upon adenomata as merely a stage in the development of malignant disease, and regard simple adenomata of the rectum as a definitely precancerous condition. It follows from this that on no account should a simple adenoma of the rectum be allowed to remain, even if it is causing no troublesome symptoms; it should be freely removed as soon as possible.



Fig. 134.—Papilloma of the Rectum just above a Houston's Valve (Sigmoidoscopic).

While in some cases an adenoma may *reach a very large size and continue to* grow for years before undergoing malignant change, or indeed may never alter its character, in other cases a very small adenoma which has not begun to produce symptoms may become malignant. The observations of Cuthbert Dukes have demonstrated that the whole tumour does not change its character, but a few cells in one part of the tumour begin to invade the connective tissue and thus form a cancer.

Treatment.—On account of their tendency to become malignant, all adenomata, however small, should be promptly and thoroughly removed, and, if necessary, the patient should be warned of the risk of their being left alone. The danger of malignancy, however, is of course partly dependent upon the age of the patient; the older the patient is, the greater is the risk of malignant change occurring. Small polypi and adenomata can be removed easily through a speculum, either by being snipped off with a wire snare or nipped away with forceps, or, if low enough down, they can be removed by ligature.

Adenomata high up in the rectum can frequently be twisted off by means of crocodile forceps passed through a proctoscope tube, or by the use of the author's snare, the base, if necessary, being thoroughly cauterized to insure the removal of all the new growth.

In the case of tumours high up in the bowel it is necessary to be very cautious, as there is sometimes peritoneum in the pedicle, and snaring the tumour will result in a hole being left in the bowel wall. It is safer to remove adenomata high up by the abdominal route rather than snare them off from the rectum.

In the case of large villous adenomata removal is a much more difficult matter. Some of these tumours involve two-thirds or more of the bowel circumference and a considerable portion of its length, and their removal is often only possible by excision of the rectum. The operation for their removal will therefore be the same as that for the removal of carcinoma, with this difference, that if the surgeon is thoroughly satisfied that no portion of the growth has yet undergone malignant change, all that is necessary is the actual removal of the involved bowel, and no attempt need be made to remove the parts widely or to excise the lymphatic areas. If, however, as is frequently the case, one portion of the tumour is found to be hard and nodular, the case should be treated as one of malignant disease, which it will almost certainly prove to be.

Removal of some of these adenomata of the rectum when large is quite a difficult matter, and frequently involves a more or less complete resection of the rectum. As has already been pointed out, they should be treated as definitely precancerous, and thoroughly removed as soon as detected. The following case is a good instance of this condition:

Case.—The patient was a gentleman, aged sixty-three, who consulted me for diarrhœa and bleeding. On examination there was a very large velvety growth completely blocking up the bowel. I operated upon the patient, and with some difficulty was able to deliver from the rectum a large villous adenoma quite as big as a fist, with a comparatively narrow pedicle. This was removed, but on examining the bowel above another and even larger growth was discovered, which was lying above its own pedicle. This was delivered with the greatest difficulty, as it could not at first be got past its pedicle, but it was eventually cut out. This patient was thought to have been cured, but he returned about six months later with further symptoms, and another large papilloma was discovered in the lower part of the sigmoid flexure almost obstructing the bowel. This unfortunately had become malignant, and in one part was firmly fixed to the bladder and was not able to be removed.

In several instances I have removed large adenomata of the rectum through a posterior incision, removal of the coccyx, and opening the rectum up from behind without interfering with the sphincter, that portion

of the wall of the bowel containing the tumour being cut away, and the parts carefully restored by stitching. Sometimes a temporary fæcal fistula forms, but in quite a number of cases primary union has been obtained, as in the following case:

Case.—The patient was a gentleman, aged fifty-six, who was referred to me by his medical attendant for a tumour in the rectum. I found he had a soft adenoma about the size of a half-crown growing from the posterior rectal wall rather high up. The tumour was sessile, and consequently could not be removed from inside the rectum. As it was clearly not malignant, there was no necessity to sacrifice the entire bowel, and I cut down on it from behind, removed an elliptical piece of mucous membrane containing the tumour, and stitched up the bowel wall and skin. A drainage-tube was inserted into the rectum to prevent pressure. The patient made an uninterrupted recovery with a perfectly normal rectum. This patient has been under observation ever since, now twelve years, and has never shown any signs of a recurrence of the tumour.

In every case where an adenoma has been removed the patient should be carefully examined with a sigmoidoscope every four months for several years afterwards, as there is a serious danger of other adenomata developing, and it is most advisable to detect them before they have reached a stage sufficient to produce symptoms.

Multiple Adenomatosis or Colitis Polyposa.—There is another variety of adenoma of the rectum in which the tumours are multiple. In such cases the entire rectal mucous membrane may be covered with minute adenomata, or there may be simply a large number of adenomata scattered about on the mucous membrane. This condition is, however, seldom confined to the rectum itself, and as a rule these growths will be found throughout the large intestine.

This condition has been named multiple adenomatosis of the colon, and stands in a class by itself.

This curious and rare disease has received considerable attention in recent years, partly because of the difficulty experienced in finding any satisfactory method of treating it, and partly because of the very marked tendency there is for the unfortunate victims to die of cancer. It was first described by Virchow in 1863 and Harrison Cripps described a case in 1882. Although the disease has accumulated a very considerable literature, most of the authors have merely given details of individual or collected cases and described the symptomatology and results. The majority have failed to draw any distinction between cases of polypi in the colon resulting from irritative or infective causes and the cases here considered of multiple adenomatosis of the colon occurring as an hereditary disease, which form a distinct disease entity, quite separate in origin from the cases due to an infective cause.

In 1927 an excellent paper appeared in the *British Journal of Surgery* by J. H. Saint in which he reviewed all the literature on the subject of polypi of the intestine. He attempted to divide the cases of multiple polypi of the colon into two classes, those due to ulceration and those which are not. He rightly pointed out that the cases associated with ulceration, which were described as colitis polyposa by Virchow, Struthers, and others, are not true adenomata, but glandular hyperplasia. Many authors have described these cases and attempted to prove that the ade-



FIG. 135.—PHOTOGRAPH OF A PIECE OF THE COLON SHOWING MULTIPLE ADENOMATA

nomata resulted from inflammation or some form of local irritation, such as the presence of parasites. A good deal of confusion has arisen from the failure of many authors to distinguish between those cases of apparent multiple tumours resulting from severe ulcerative colitis and the true cases of multiple adenomata where no ulceration or inflammation is present, and this confusion even exists in most pathological museums. The appearance of tumours in old cases of ulcerative colitis is due to islands of inflamed mucous membrane left behind by the ulceration. It is very evident, if specimens are carefully examined, that these apparent tumours

are not true adenomata. A very excellent review of the whole literature of these curious cases was made by Cuthbert Dukes in the *Cancer Review* for April, 1930. In it he reviewed all the literature since the publication of Harrison Cripps's cases in 1882.

It is necessary to point out that there is a definite disease entity called "multiple adenomata of the colon," which occurs as a familial disease, and is quite independent of any similar conditions produced by infection or ulceration. This disease is in a similar category to hæmophilia, albinism, brachydactyli, deaf-mutism, and other similar hereditary conditions, which are handed down from one generation to another, either as Mendelian dominants or recessives. Since 1925 a great deal more care has been taken to trace the family histories of these cases, and it is now thoroughly established that multiple adenomatosis or polyposis is an inheritable disease, which is transmitted by both sexes, and attacks both sexes; it appears to be a Mendelian dominant. An interesting point in connection with it is that the children are not born with it, but tend to develop the condition about the time of puberty. This is particularly interesting from a genetic point of view, and in this respect it differs from most of the well-known hereditary diseases. While in most cases the disease first develops at puberty, or in early adult life, in a few cases it does not develop till considerably later. One of my cases, a man of thirty-nine, was very carefully examined by me with the sigmoidoscope, because I knew he came from a family with the disease, and I found his colon quite normal. Yet four years later this patient, when again examined, was found to exhibit the disease in a well-marked form, and a sister of his has recently developed the disease at the age of thirty-seven. I have never seen a case in an infant, nor is there, I believe, any authentic case on record. The adenomata do not appear as a rule to form before puberty, and in this respect it differs from many other hereditary diseases, although there are other abnormal conditions showing the same peculiarity. Thus hereditary optic atrophy comes on about puberty, and hereditary amaurotic family idiocy first shows its appearance at from five to seven years of age.

It is only comparatively recently that our knowledge of biology has given us the clue to the origin of such conditions, but there can be no doubt that in the near future this type of disease, or abnormality, will receive a great deal more attention, both from medical men and from research workers, than has hitherto been the case, since such conditions fall into a class of their own, and so to speak belong to an entirely new chapter in the book of medical knowledge, a chapter which we have only just begun to read. In the light of modern biology we are now able to explain such conditions as this, and although to some people the explanation may appear fantastic, it will soon be a well-recognized factor in medicine.

A change, or mutation, has taken place in the genes of some individual who has not personally exhibited the diseased condition, but who has passed the mutated genes on to his descendants. We cannot trace the origin of this disease, but in the case of *hæmophilia* we can with fair

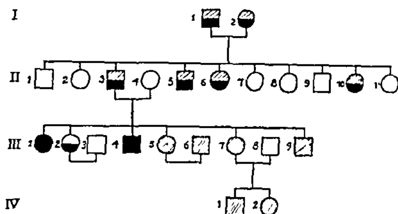


Fig. 136.—M. Family.

I. (1) and (2) Both died of cancer of the rectum. II. (3), (5), (6) and (10) All died of cancer of the rectum. III (1) Developed adenomatosis at the age of fourteen, and had the whole colon removed in 1918. She is well now, fifteen years later. (4) Died of cancer of the rectum, aged thirty-six. (3) Died of cancer (probably rectal).

certainty say that the mutation occurred in some ancestor of the Coburg royal family some two or three hundred years ago. Friedreich's ataxia *appears to have arisen in one of the Swiss valleys several generations ago,* but we are only just beginning to study these hereditary diseases from the

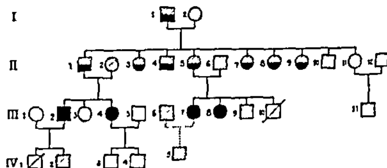


Fig. 137.—N. Family.

I (1) Died of cancer, aged forty-two. II Of nine children, seven died from cancer of the rectum, and the other two have not been traced. III (2) Developed adenomatosis at forty-five (3) Had not been examined. (4) Developed adenomatosis at forty (7) Developed adenomatosis at thirty, and had colectomy performed, is well to-day, ten years later (8) Died of cancer, aged thirty-three

genetic standpoint, and the time at which they started cannot be fixed with any accuracy from the available data.

It can be definitely asserted that adenomatosis is an example of gene mutation. There are numerous other examples of diseased conditions

which must also be considered as the result of mutations, and so far very few have been carefully studied from this point of view. When a mutation of the genes has taken place, the results may appear in succeeding generations either as dominants or recessives. If as a dominant the condition will tend to occur in every generation, but if the disease is a recessive it will only be seen when both parents carry the mutated genes, which may not occur for very many generations, and then the hereditary factor is very likely to be missed.

The genetic origin of several of these cases of adenomatosis has now been carefully traced, and no one who studies these family histories can doubt that the condition is definitely hereditary (see Figs. 136, 137, and 138).

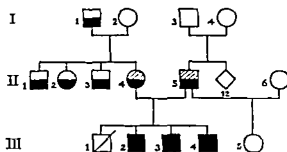


FIG. 138.—L. FAMILY.

In this family III. the condition of adenomatosis appears to have been inherited from both parents III (2) Adenomatosis, aged twenty-four (3) Adenomatosis, aged twenty-three, died after colectomy. (4) Adenomatosis, aged twenty; cancer a year later. The family of II by the second wife have not been traced.

KEY TO FIGS. 136-138.

Males — Females.

Adenomatosis — Cancer of the intestine

Cancer of other organs — Doubtful

As already stated, the condition is not found in infancy. We must, therefore, conclude that the hereditary factor is the susceptibility of the epithelial cells of the large intestines to proliferate at a certain age. In most cases this age appears to be about the age of puberty, most of the patients first exhibiting symptoms at ages from about twelve to twenty. The result is the formation of numerous simple adenomata throughout the large intestine. The actual number of adenomata in any individual case is often quite uncountable. The other feature of the disease which is of particular interest is that after a certain time there is a very marked tendency for one or more of the adenomata to form the starting-point of a malignant adeno-carcinoma. A careful microscopic study of some of

these cases show that the tumours do not suddenly become malignant, but that one small portion only of the tumour changes its character and becomes a cancer, and that this gradually spreads until it has destroyed the remainder of the simple tumour (see Fig. 133). This tendency for the simple tumours to become malignant is very marked in this disease, so much so that practically all the patients develop carcinoma sooner or later, and mostly at quite an early age. In a few cases several of the adenomata become malignant simultaneously. The probable explanation of this secondary malignant change is that the rapidly proliferating tissue, of which there is an enormous quantity in the numerous adenomata, affords a great opportunity for another mutation for malignancy to occur in the rapidly reproducing cells of the adenomata. We know that all adenomata are liable to undergo malignant change, and it follows that if there are a very large number of adenomata the chances of a mutation for malignancy of the somatic cells will be very much greater. The particular interest of these cases lies in the fact that neither the adenomata nor the cancer, which is superimposed at a later time, is hereditary in any strict sense. The hereditary factor which is passed on from one generation to another as a Mendelian dominant is the susceptibility to excessive proliferation of the epithelial cells of the colon.

I do not propose to discuss at length the symptoms of the condition, nor the diagnosis. The symptoms are those of ulcerative colitis with mucus, diarrhœa, and blood, and the diagnosis is easily established by an examination with the sigmoidoscope. Quite recently we have been trying at St. Mark's Hospital, and they have also been trying at the Mayo Clinic, to find a technique which will make it possible to demonstrate the condition by means of X-ray enemata, so that the actual extent of the disease in the colon can be discovered, as the sigmoidoscope only makes it possible to see the condition as far as the lower end of the colon.

Treatment.—This is an extremely difficult matter. The importance of being able to do something is obvious, since the vast majority of these patients with multiple adenomatosis die from cancer at a very early age, and the tendency to secondary development of cancer is so great that anything that will tend to prevent it would seem to be justifiable. It is, I think, obvious to anyone looking at the specimens that no treatment short of complete colectomy can be of any avail, and even that cannot completely eradicate the disease, as several of the adenomata will still remain in the rectum. The latter can, however, be removed locally, as they occur, by keeping a careful watch upon the patient. Complete colectomy, which will have, as a rule, to be carried out in a young person between the ages of eighteen to twenty-five, is a very serious and mutilating procedure, and may not seem justifiable. On the other hand, if these cases are left untreated they will almost certainly die of cancer at an early age, so that

drastic measures would seem justifiable. The following case well illustrates this:

Case.—The patient was a servant girl, aged eighteen, who was sent to me by a doctor in the Midlands. She had typical adenomatosis involving the rectum and the whole of the colon up to the cæcum. She was so young that I hesitated to do a complete colectomy, and I therefore sent her home and wrote to her doctor asking him to keep a watch on her. He sent her back to me four months later, as he considered she was so much worse that a colectomy was justifiable. On examining her again on her return I found a large carcinoma had developed in the rectum since she had been seen four months previously. The tumour was nearly 3 inches across, and had already perforated the bowel wall and invaded the deep lymphatics, although four months previously there had been no sign of it when she was examined. In order to try and save her life I had to do a colectomy of the greater part of the colon and the whole of the rectum. She recovered from the operation and is well one and a half years later, but the prognosis is not good.

The first case of colectomy for adenomatosis was, I believe, performed by Lienthal in America. The operation was done in three stages. I performed my first colectomy for this condition in 1918, and I have in all done four complete colectomies for this disease. All the patients were young women under twenty-four years of age at the time of operation, and at the present time they are all alive and well, but they have to be examined every six months, as there is a tendency to recurrence of the adenomata in the rectum. When these tumours are discovered, they are removed locally either by diathermy or by the application of nitric acid. The first patient operated upon fifteen years ago is still in good health, although all her brothers and sisters, aunts and uncles, have died, those who did not die in infancy having died of carcinoma. Her sister, two years younger than herself, died of carcinoma six years ago. The operation, therefore, would seem to have been more than justified in her case.

In one case an attempt was made to deal with the condition by means of X rays. The patient was given deep X-ray therapy to the whole of the colon. The result was to make him very unwell for a time, and he was some six months recovering. The effect of the X rays upon the tumours was that they appeared to stop growing, or at any rate they grew much more slowly for a time, and some appeared to be turned into fibrous tumours, although three years later he still had extensive adenomatosis and the tumours appeared to be again growing. Further treatment with X rays was not considered justifiable in view of its comparative failure on the first occasion.

Unsatisfactory as it may seem, complete removal of the colon would appear at present to be the only method of treatment for these cases that is worth considering.

These cases have all now been watched for a considerable time, and it is evident that the absence of a colon does not prevent satisfactory nutrition, as none of the patients have exhibited any permanent loss of weight, and two at least have put on weight. Slight looseness of the bowels is present in all of them, but in none is it sufficient to cause any serious inconvenience. For details of the operation of colectomy see p. 583.

CHAPTER XVIII

CANCER OF THE RECTUM

CANCER is still one of the chief killing diseases of the world, and is accountable for more deaths annually than tuberculosis. Cancer of the rectum ranks with cancer of the breast, uterus, and stomach as one of the commonest forms of cancer to which human beings are subject. Thus, in 1928, when the British Ministry of Health made a report on the results of operation for cancer of the rectum, they were able to collect particulars of nearly 6,000 cases. At present we know of no means of preventing it, and can only cure it in a small percentage of cases, but a very great deal of research is now going on in most of the civilized countries of the world, and rapid progress is being made towards a better understanding of the causes and methods of treatment. We have just recently discovered the way in which cancer arises in tissues, and this is discussed at length in the author's book, "The Origin of Cancer," to which the reader is referred for a full discussion of the etiology of malignant and other tumours. Now that we know that cancer arises as the result of a gene mutation in a somatic tissue cell, and we can understand the manner in which normal tissue cells develop into a malignant tumour, we should be in a better position to progress towards the stage when we can adequately control the disease.

There is a general impression in the medical profession, and, in fact, universally among the public, that cancer in all its forms is becoming much more common than it used to be. There is certainly no doubt that a larger number of cases are met with by surgeons of the present day than was the case fifty years ago. Also, the number of cases returned as having died from cancer is very much higher than it used to be. The following table shows the actual figures from 1916 to 1933.

CANCER MORTALITY FIGURES FOR ENGLAND AND WALES.

1916	40,630	1925	51,939
1917	41,158	1926	53,220
1918	41,227	1927	54,078
1919	42,144	1928	56,253
1920	43,687	1929	56,896
1921	41,915	1930	57,882
1922	46,903	1931	59,346
1923	48,668	1932	60,715
1924	50,389	1933	61,572

The question is often asked, "Is cancer curable?" If we had asked this question fifty years ago, it would not have been possible to have given a satisfactory answer, as no real evidence existed at that time, but to-day, as the result of organized methods and the systematic recording of large numbers of cases, we are beginning to arrive at definite conclusions, which enable us, at any rate, to attempt to give an answer to this question. Before, however, we do so, it is necessary to ask ourselves another question. What do we mean by the word "cure" in regard to cancer? For instance, if a patient has a tumour of the rectum, which is proved by microscopical examination of a small portion of the growth to be a definite cancer, and if the patient is treated by surgical removal of the tumour or by radium, and a year later the patient is quite well and has no sign of anything wrong, are we justified in saying that this patient is cured? Many people might think so, but no doctor will accept this view, as he well knows that the tumour may still return, even if no evidence of its presence can be found.

A great many surgeons accept as a cure any case in which the tumour has disappeared and there is no sign of recurrence three years after treatment, but this is also not satisfactory, as in many cases the growth recurs after this period. At some hospitals very careful statistics of all cases of cancer have been kept for many years, and all the cases have been, so far as is possible, kept in touch with, to find out what ultimately happens to them. On examining such figures, it is found that very few cases recur after five years, and hardly any after six years. We should probably be perfectly safe in assuming that any patient who had survived treatment for seven years without signs of recurrence was definitely cured. In actual practice we do not take such an extreme figure, as it would require so very many years to arrive at any results. Cancer is a disease of elderly people, and many of the patients die of other causes within seven years. The generally accepted view is that five years can be taken as a cure; and although it is not quite accurate, it is found in practice to be very near the truth. We assume, therefore, that any patient is cured of cancer if he or she is quite well five years after the tumour is removed, or has been made to disappear by means of radium.

Unfortunately there is another possible fallacy: a patient who has been cured of cancer in one part of the body may in course of time develop cancer in some other organ. The fact that an individual has been cured of cancer in one organ does not guarantee him against getting cancer elsewhere. This, again, confuses the issue and makes it very difficult to give any very satisfactory definition of what we mean by cure in such a disease as cancer.

Nevertheless, I have no hesitation in answering the question, "Is cancer curable?" by the positive assertion that it is, whatever definition we

accept, but the percentage of cases that are cured is far too small. There is one essential to successful operative treatment, and that is early diagnosis of the lesion. The chief hindrance to successful treatment is the fact that in the great majority of cases the diagnosis is not made until it is either too late for there to be any hope of successfully removing the growth, or until the best time for treatment has already passed away. Unfortunately cancer of the rectum usually gives rise to but few symptoms in the early stages, and unless great care is taken in examining patients who complain of bowel symptoms, the diagnosis will not be made until actual symptoms of obstruction occur, by which time in most cases the growth has progressed too far for complete excision to have a fair chance. When a cancer of the rectum has advanced to the stage at which it begins to cause obstruction to the bowel lumen the symptoms are, as a rule, readily recognized, and there is not much difficulty in making a diagnosis; but unless we are content to do nothing more than tell our patients when they are going to die, this is not sufficient. We must be able to recognize the presence of cancer in the large bowel at an earlier stage than that at which obstruction is produced.

It is an unfortunate fact that even at the present day two-thirds of the cases of rectal carcinoma which are sent up to, or apply for admission to, St. Mark's Hospital are suffering from growths in the bowel which have already reached too advanced a stage for removal to be possible. No less than 63 per cent. of the cases coming to the hospital are found to be inoperable when first seen. All that can be done in these cases is a colostomy with the object of relieving the symptoms and preventing obstruction. Even in private practice considerably over half the cases seen are already too advanced for operation at the time the diagnosis is made; this fact is the greatest bar to the successful treatment of cases of cancer of the rectum.

In the report of the Ministry of Health already quoted at the beginning of this chapter it was shown that out of 6,000 cases the average period elapsing between the occurrence of the first symptoms and the patient coming to operation was twelve months. It is obvious that this is a dreadful handicap to successful treatment.

The chief cause of the late diagnosis, as we have seen, is that cancer of the rectum produces very few symptoms in its early stages. It must, however, be admitted that in many instances the late diagnosis is due to the fact that the medical practitioner who was first consulted neglected to make a local examination. It is now possible to diagnose cancer of the rectum or of the lower part of the sigmoid flexure with absolute certainty, even in the earliest stages, provided an examination is made, and this being so, the proportion of cases found to be inoperable when the disease is first diagnosed should certainly be very much reduced.

Age.—Cancer of the rectum may develop at any age. The youngest patient with this disease seen at St. Mark's Hospital was a child of eight, but cases younger than this have been reported. Phifer collected twenty cases of cancer of the sigmoid and rectum in children under sixteen years of age, and Wainwright seven cases of cancer of the colon in children. Drinkwater recorded the case of a girl of fifteen with acute obstruction due to a cancer of the colon.

Out of 200 consecutive cases of cancer of the rectum from my private case sheets, the ages were as follows: Under 30, 3; 30-40, 10; 40-45, 10; 45-50, 22; 50-55, 36; 55-60, 47; 60-65, 42; 65-70, 16; over 70, 14.

It will be seen that the age at which the largest number of cases occurred is between fifty-five and sixty, the next commonest the following five years, but that after reaching a maximum at fifty-five to sixty-five there is a rapid decline in the number of cases as the age increases. There can be little doubt that this decline is due to the decreased number of persons living over the age of sixty, and partly to the fact that at the higher ages a larger number of cases are inoperable on account of their age. The chart (Fig. 139) is given to show the age incidence of cancer when taken from a really large number of cases. It is from Dr. Frederick Hoffman's "Mortality of Cancer throughout the World," and shows, as might be expected, a steadily increasing incidence of cancer with increasing age.

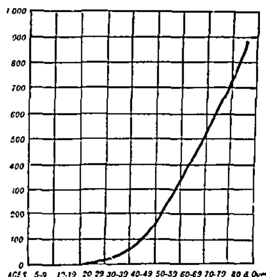


FIG. 139.—CANCER MORTALITY: AGE RATE PER 100,000 POPULATION.

My age table demonstrates the value of an operation with a comparatively low mortality risk, as it will be seen that no fewer than seventy-two patients out of 200 would have been too old for operation by the abdomino-perineal route.

Sex.—Cancer of the rectum and colon is apparently slightly commoner in men than in women. Most statistics show about 60 per cent. men.

These figures, again, are probably not accurate, as it must be remembered that nearly all statistics are drawn from hospital practice, where both men and women are taken, and that such statistics are vitiated by the fact that many women go into special women's hospitals and are treated there; this tends to reduce the number of cases of women with

cancer of the rectum admitted to general or special rectal hospitals. Private practice does not appear to show any marked difference between the sexes as regards their predisposition to cancer of the rectum.

In my last series of 340 cases, taken from both private and hospital practice, 210 were males and 130 females. This is in the proportion of about 3 males to 2 females, and corresponds very closely to the proportion shown in the Ministry of Health figures for 1925, which work out at 4 males to 3 females.

Predisposing Conditions.—In my own cases, what would appear to be the most important predisposing cause of the disease, apart from age, is the presence of simple adenomata in the bowel. For the last few years these have been very carefully looked for in all cases of excision, with the result that they were found associated with cancer in all but a very few of the cases examined. It seems probable that in the few cases in which no adenomata were discovered they may have been present higher up in the bowel, since the area examined was necessarily confined to the parts removed. This is borne out by the fact that in one case an adenoma was found on the mucous membrane of the colostomy. This subject has been extensively investigated recently, and is referred to at some length in Chapter XVII on precancerous tumours.

Heredity.—It was for a long time thought that there was no hereditary factor in cancer, but in the last ten years this view has had to be revised, as the result of the work of Simpson and Maud Slye on mouse breeding, and the papers by Cuthbert Dukes and myself on the hereditary factor in multiple adenomatosis of the colon. It is now recognized that cancer is more or less specific to a certain organ—that is to say, there is not one form of cancer, but many, and an hereditary cancer tendency would be for a single organ. Thus Simpson of Chicago has succeeded by in-breeding in producing a strain of mice in which 90 per cent. of the females develop cancer of the mamma spontaneously, while the males do not develop cancer at all. Maud Slye has succeeded similarly in producing a strain of mice with an hereditary tendency to develop cancer of the uterus. I was able to show that cancer of the large bowel had a very strong hereditary tendency to develop in certain families. The fact that in homologous or uniovular twins a tumour in one twin is found to be also present in the other twin of the same type and in the same situation is very strong evidence that there is a genetic factor of great importance. The genetic factor is not, however, for cancer, but for excessive proliferation of a particular tissue at a certain age.

It is often asserted that neglected fistulæ, fissures, and piles, or old chronic ulcers of the rectum or anal region, are liable to set up cancer. It is, however, very doubtful if such conditions are at all an important factor in the origin of cancer. I have twice seen a fistula which had been

in existence over fifty years without undergoing any cancerous change, and piles frequently exist for many years in an advanced condition without causing such a change. Unless there is an hereditary susceptibility to cancer of the bowel or skin, I think such factors are unimportant, but as we are not in a position to know whether or not our patients have this susceptibility, it is much wiser to remove any chronic lesion in the rectum or anus as soon as possible. Chronic inflammatory conditions, such as old fissures and fistulæ, are liable to undergo a change in susceptible individuals because the cells are reproducing themselves at an excessive rate, and are therefore afforded a greater chance of a mutation for malignancy.

I have three times seen badly prolapsed internal piles, which had been in this condition for many years, act as the starting-point for a cancer. In one case, an elderly man had a large pile which had been permanently outside the anus for ten years or more. I found there was a papillomatous growth on the apex of the pile, and when this was removed and examined it showed typical carcinoma. Such cases are, however, very unusual.

Diagnosis.—The first thing that we must know is, obviously, what symptoms should make us suspicious of cancer in the rectum or colon. Once we have got so far as to be suspicious of the presence of a growth in the bowel, it then only remains to apply special methods of diagnosis to confirm or refute our suspicions; but the most important step is to know when these methods should be applied.

Early Symptoms of Cancer of the Bowel.—One of the earliest symptoms of cancer of the bowel is a sense of discomfort in the rectum and difficulty in getting the bowels properly relieved. The pain complained of in these cases varies considerably, and in many it is altogether absent. Pain in the sacrum or in the lower abdomen is sometimes felt. Diarrhœa is a common early symptom of cancer of the rectum, and is often most deceptive. It frequently happens that the diarrhœa only occurs occasionally, and may then be readily attributed by the patient to some error of diet. When a patient, especially an elderly one, complains that during the course of a few weeks or months he has had several attacks of diarrhœa without any very definite cause, we should view the case with grave suspicion. *Slight diarrhœa on first rising in the morning is a symptom* which should always give rise to a suspicion of cancer of the bowel. The fact that the diarrhœa is readily stopped by taking some simple astringent medicine is no reason for excluding cancer as a possible cause. Chronic diarrhœa, with but few exceptions, is due to some lesion of the large bowel, *and in elderly patients one of the commonest causes is cancer.* Chronic diarrhœa in such a patient is therefore a most suspicious symptom. The diarrhœa is never copious, but is of the characteristically irritative type. The stools are frequent and small in amount, often consisting of little more than an ounce or so of slime or watery discharge mixed with a little

fæcal material. Another common characteristic of this form of diarrhœa is that it is frequently accompanied by inability to retain the contents of the bowel for more than a few minutes; thus the patient will say that he is obliged to seek the nearest lavatory directly he feels a call to stool. The real condition, in fact, is not diarrhœa, but constipation. The diarrhœa is spurious, and on careful inquiry and examination we find that the patient has not really passed a proper quantity of fæcal material for a considerable time, in spite of the fact that the bowels may have acted in this spurious manner several times a day.

Mucus in the stools is often an early symptom of cancer; it is almost invariably accompanied by a certain amount of diarrhœa or looseness of the bowels. I have seen several cases of cancer of the sigmoid flexure in which this was the only symptom, a sigmoidoscopic examination disclosing the presence of the tumour. Mucus in the stools, of course, frequently occurs as the result of other conditions besides cancer. The mucus may be in the form of definite mucous casts, which are often supposed to be characteristic of membranous colitis, and I have seen two cases of cancer of the colon in which such typical casts were passed.

Blood in the stools, especially when the blood is intimately mixed with the fæces, is always a significant symptom, but, unfortunately, it is often entirely absent or does not occur until quite late in the progress of the case. I have, however, recently operated on a case where the only suspicious symptom was a sudden and severe hæmorrhage from the bowel on two occasions with about a week's interval. The growth in this instance was situated in the lower end of the sigmoid flexure at its junction with the rectum.

Occult blood is probably almost always present in the stools in cases of cancer of the colon, but it may be present in minute amount, and should be tested for by a chemical test such as that mentioned on p. 389 and on several occasions. If found at all consistently, the presumption that a growth, or at any rate an ulcerative lesion, is present in the colon is very strong.

Bleeding from the bowel is a common and often early symptom of cancer of the rectum, owing chiefly to the fact that the bowel is fixed and traumatism from the passage of fæcal material readily occurs, giving rise to ulceration of the growth at an early stage. In cancer of the more mobile colon, however, traumatism does not so readily occur, and chiefly for this reason blood in the stools is not a common symptom of cancer of the colon. Although blood in the stools is not common when the stools are examined in the ordinary way, it can often be detected if a microscopical examination of the fæces is made.

There are two symptoms which are often mentioned as of importance—namely, loss of weight or cachexia, and ribbon or pipe-stem fæces. Neither

of these is, however, of any importance or diagnostic value. Loss of weight only occurs in the late stages when there is a large growth, or when diarrhœa is a prominent symptom, and is commoner in other conditions than in cancer. Pipe-stem fæces can only occur in rectal cancer when

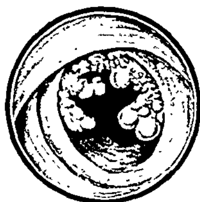


FIG. 140.—TUMOUR HIGH UP IN THE SIGMOID FLEXURE (SIGMOIDOSCOPIC).



FIG. 141.—MALIGNANT GROWTH AT THE LOWER END OF THE SIGMOID FLEXURE GROWING FROM THE ANTERIOR BOWEL WALL (SIGMOIDOSCOPIC).

the growth involves the anus, as *it is obvious that the fæces will take* their shape from the *last* orifice through which they pass, and that even if the fæces become narrowed in passing a stricture in the colon, they would be remoulded in the rectum.

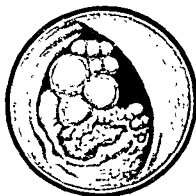


FIG. 142.—CANCER HIGH UP IN THE RECTUM (SIGMOIDOSCOPIC).

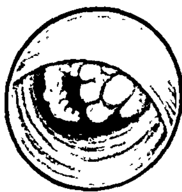


FIG. 143.—CANCER IN THE UPPER PART OF THE RECTUM (SIGMOIDOSCOPIC).

By far the most important and valuable method for the diagnosis of *high growths is examination with the electric sigmoidoscope*, and whenever possible this method of examination should be utilized. It enables us readily to examine the upper rectum; moreover, *since it causes no pain* and but little discomfort, and does not necessitate an anæsthetic, it can be

used in doubtful cases without putting the patient to any great inconvenience.

Site of the Growth.—The commonest position for rectal cancer is at or about the recto-sigmoidal junction, the next commonest situation is the rectal ampulla, and the least common is the anus. We notice that by far the commonest situation is unfortunately the worst from the point of view of treatment—namely, high up in the rectum, and involving the peritoneal cavity. It is well known that growths in the rectum, as they increase in size and tend to produce obstruction, gradually get pushed down, until eventually they become partially invaginated into the bowel below, so that ultimately they occupy a much lower position in the bowel than that in which they first originated.

Pathology.—Cancer of the rectum may be of two kinds—epithelioma and adeno-carcinoma. Several other varieties are often described, such as medullary, adenoid, scirrhous, and colloid carcinoma, but these are only forms of adeno-carcinoma, and owe their different appearance to the rapidity of their growth and the secondary changes which they undergo; primarily they are all the same.

Epithelioma occurs only at the anal margin, and has all the usual histological characters of skin cancer. In the later stages it often invades the rectum, but it is always primarily a skin cancer.

Epithelioma of the Anus.—Of all forms of malignant growths of the rectum, epithelioma of the anus, or squamous-celled carcinoma, forms only about 3 per cent. of the total. These tumours appear as callous indurated ulcers, generally at the anal margin, and more rarely as circular ulcers on the perineum or buttock, close to the anal margin. These tumours are often mistaken at first for chronic fissures, or tubercular ulcers. Their extreme hardness should, however, render the diagnosis easy, and when there is any doubt the removal of a piece of the edge for microscopical examination will clear up the diagnosis. It is a curious fact that they are quite often not diagnosed soon enough, though the fact that they cause pain and discomfort when quite small and are easily seen should result in their being diagnosed at a very early stage.

It is generally considered that the prognosis in epithelioma of the anus is bad, and the results as regards cure worse than for adeno-carcinoma of the rectum. It all depends on the stage of the disease at which proper treatment is instituted. If the inguinal glands are already involved the prognosis is certainly bad, but if these glands are not involved the prognosis should be good. At the present day these cases are best treated, in my opinion, by radium (see p. 362).

Adeno-carcinoma starts in the basement cells of the rectal mucosa, and the cells of the tumour have the typical appearance, though they

differ from the normal cells in that the arrangement of the cells is irregular and that as a rule they show no secreting function. There are, however, marked exceptions to this. I have several times seen cancer of the rectum which secreted mucus very freely.

Adeno-carcinoma, which is the variety always met with in the rectum, except in cases where an epithelioma of the anus has secondarily involved the rectal mucosa, is seen to consist of a number of irregular convoluted tubes lined with columnar epithelium, the tubes being separated by a fine network of connective tissue containing bloodvessels. The epithelium lining the tubules resembles the normal epithelium of the glands of Lieberkühn, but the arrangement is irregular. Masses of round cells can also be seen crowding the stroma between the glandular elements of the tumour. If the tumour has undergone colloid change, large masses of colloid material can sometimes be seen throughout the tumour replacing the glandular elements.

In the so-called scirrhous type of cancer the stroma consists largely of fibrous tissue, and this may be so dense as almost to obscure the glandular elements of the growth, which from compression by the surrounding fibrous tissue become much changed in shape and appearance. Such tumours cause considerable stricture of the bowel, and on section are seen to be composed mainly of solid fibrous tissue. They tend to grow slowly, but early cause obstructive symptoms. They are commoner in the colon than in the rectum.

Very occasionally cases are seen in which a growth, which should be an epithelioma, and which apparently arose from the skin at the anal margin, is found on microscopic examination to be composed of columnar epithelium, and to be therefore really an adeno-carcinoma. Two such cases of great interest were reported to the British Proctological Society by Mr. Ernest Miles and Sir Charles Gordon Watson. In one of these cases the growth was associated with a fistula, which was of longer standing than the growth, and it appeared probable that the growth had started as a columnar carcinoma at the inner end of the fistula, and had tracked down to the skin along the fistulous track by invasion of the walls, and so reached the skin, which had become secondarily involved. This may afford an explanation of these apparently anomalous cases.

The common adeno-carcinoma is a more or less nodular or cauliflower-like growth in the mucosa projecting into the bowel lumen. The surface may or may not be ulcerated, depending upon the time the growth has existed and the amount of traumatism to which it has been subjected. Very rarely the tumour exists as a polypus hanging loose in the bowel lumen. In some cases there may be several such polypi, all showing malignant changes. Sometimes the growth may form the apex of an intussusception.

The very earliest cancers of the rectum that have been seen have been adenomata undergoing cancerous change, and this has led me to the belief that probably all cancers of the rectum arise in this manner, a conclusion which agrees with the observations of Sir Lenthal Cheatle with regard to duct cancer of the breast and Dr. Hurst with regard to cancer of the stomach. Fig. 130 shows a section of the earliest carcinoma of the rectum that I have met with, and Fig. 133 shows a very early carcinoma which strongly suggests that it has also arisen from an adenoma of simple type. One is driven to the conclusion that cancer is an accident occurring to a previously existing adenoma.

Carcinoma of the rectum may occasionally undergo calcareous degeneration; two such cases are recorded. One, an elderly gentleman, a patient of mine aged seventy-five, had a large growth on the posterior rectal wall which I removed. The central part of the growth was quite hard, and consisted of bony spicules in a fibrous stroma mixed up with cancer cells: outside this was a zone of rapidly growing carcinoma with the ordinary histological characters. A somewhat similar case is recorded by Cuthbert Dukes. The patient was a man, aged fifty-seven, in whom a recurrent cancer of the rectum had undergone calcareous change.

Methods of Extension of Rectal Growths.—Carcinoma, when once established in the wall of the rectum, tends to spread in all directions until it has invaded the neighbouring tissues. A study of the exact manner in which this spread takes place, and of the directions in which it tends to occur, is of the utmost importance as long as our only means of treating the disease is by its local removal. It is obviously useless to remove a growth in the rectum unless we can be fairly certain that we have removed the whole of it, both macroscopic and microscopic. Our present knowledge of the disease tends to show that if we can be certain that we have removed every cancer cell, recurrence will not take place, and the patient will be cured of the disease.

A great deal of light has within recent years been thrown upon the methods of the spread of cancer in the wall of the alimentary tract, and this has been of great value in guiding the surgeon to the most effectual means of eradicating the disease. It has, however, I think, led some surgeons to the performance of quite unnecessarily extensive operations in cases where the same result could have been obtained with less mutilation. In its earliest stages cancer of the rectum is a purely local disease, and if excised, together with the surrounding portions of the bowel wall, will not recur.

A very careful investigation into the methods and lines of spread of carcinoma in the rectum has recently been carried out in the Cancer Research Department of St. Mark's Hospital by Cuthbert Dukes, the

Director. This investigation shows that cancer of the rectum spreads by three distinct paths: (1) By infiltration into surrounding parts through continuity of tissue, both on the surface and deep to it, (2) by the lymphatics; (3) by the veins.

Extension by infiltration is the first method of spread, and as long as this is the only means of extension cancer remains a local disease capable of eradication by excision. The amount of surface proliferation varies greatly in different cases. The surface growth enlarges by marginal increase growing out from the centre, and its depth increases by infiltration of the rectal wall. Characteristic features of this deep infiltration are that the growth is more extensive in the submucosa than in the mucous membrane, and that infiltration through the muscle coat takes places by root-like projections which push their way between the segments of the circular muscle, and at this stage, which there is good reason to believe lasts usually for a considerable time, the disease is quite local. By the time the growth has reached the muscles it has commenced to ulcerate, usually opposite the point of deepest infiltration. No constant relationship is evident between the extent of the surface growth of cancer of the rectum and the depth of extension; thus, protuberant malignant growths almost completely surrounding the bowel may be limited to the mucous and submucous coats, whereas a small ulcerating growth may have already spread into the perirectal tissues. Usually growths which project into the lumen of the bowel are less likely to have already infiltrated the muscular coat than those which show an excavated ulcer with raised edges.

All cases of cancer of the rectum are classified into three groups—A, B, and C—according to the depth of spread in the rectal wall.

A cases are those in which the growth has not extended beyond the *muscular coat of the rectum.*

B cases are those in which the growth has extended beyond the muscular coat into the perirectal tissues, but has not involved the lymphatic glands.

C *cases are those in which* the growth has extended into the perirectal tissues and has involved the lymphatic glands.

A similar classification was adopted by me many years ago, but it was based on clinical examination, and the grading was not histological. During the last few years the present method of classification based on histological examination has been substituted. This is far more accurate, and is that which is now being adopted more or less generally. Careful grading of cases is of the greatest value in ascertaining the after-results of operation.

TABLE I.—AUTHOR'S CASES CLASSIFIED BY THIS METHOD.

Classification of Growth	*Number.*	*Mortality from Operation.*	*Recurrences.*	*Alive Three Years or More.*	*Died of Other Causes or Untraced.*
A	22	1	1	18	2
B	28	2	9	15	2
C	30	1	21	4	4
	80	4	31	37	8

TABLE II.—HOSPITAL CASES CLASSIFIED BY THIS METHOD.

Classification of Growth	*Number.*	*Mortality from Operation.*	*Recurrences.*	*Alive Three Years or More.*	*Died of Other Causes or Untraced.*
A	28	0	1	25	2
B	40	2	9	19	10
C	52	8	24	13	7
	120	10	34	57	19

It will be noted from these tables that both the operative mortality and the percentage of cures is profoundly affected by the stage which the disease has reached at the time of operation. Also the much higher percentage of C cases among the hospital patients is noteworthy. A considerable number of the cases in these tables have survived over five years, but the method has not been in use long enough to construct tables on the basis of five-year cures. It will also be noted that the lymphatic glands were involved in about 40 per cent. of cases.

In this series of cases all glands in the area were examined. Experience has proved that microscopic examination of these selected tissues is sufficient to settle the question of the presence or absence of glandular metastasis, and it also provided many forcible reminders that enlarged and hard glands do not necessarily contain cancerous metastasis. Such glands are often enlarged from inflammation and fibrosis. Downward spread of the growth was looked for in all these cases, but was only found in four—one along the levator ani muscle and three in the ischio-rectal fossa—and it appeared that this spread was mainly by direct continuity, or by grafting of cancer cells during operation. There is very little evidence that downward spread of cancer is at all a common occurrence.

Spread of cancer of the rectum by the continuity of tissue is usually a slow process. Judging from clinical histories, many months may be occupied by the progressive extension through the rectal wall. Once the perirectal tissues have been reached, spread by the lymphatics commences and may be rapid. It is very doubtful whether any spread by the lym-

phatics occurs until after perforation of the muscular wall. The cancer cells spread along the lymphatic channels and invade the nearest lymphatic glands, which in the case of the rectum are those lying in immediate contact with the rectum and in its immediate neighbourhood in the rectal mesentery. The glands tend to delay the spread of the cancer cells, and the next stage is that in which the cells spread to the secondary lymphatics lying in the base of the mesorectum and in the lumbar glands. It is very doubtful if, once invasion of these secondary glands has occurred, recurrence can be prevented by any operation, however extensive. This spread to the secondary glands does not occur until a very late stage in the disease. It will be observed that cancer starts as a local disease, and in most cases remains localized to the rectal wall for a considerable time. During this time it is curable, but once lymphatic invasion has occurred the chances of a cure are doubtful.

At probably any period in the history of cancer of the rectum the cancer cells may obtain entrance to a vein, usually by direct extension, and a venous embolism may occur. If this happens the cells will be carried away into the liver, where they will tend to grow and produce secondary deposits. There is reason to believe that this accident may happen to cancer even in the very early stages, while on the other hand it may never occur at all. Thus, out of fifty autopsies on patients who had died of cancer of the rectum examined by Clogg, secondary deposits in the liver were only found in seven cases. Spread by the blood-stream may be looked upon as a pathological accident due to some detached cancer cells having found their way into the veins. There is no means of estimating when this accident may occur, or when it has occurred.

Spread by the blood-stream into other organs than the liver is apparently rare. Occasionally cases are met with where secondary deposits have formed in bones or in the lung, but they are exceptional.

Much confusion of thought has resulted in the past from the fact that surgeons have often assumed that all enlarged lymphatic glands in the neighbourhood of a growth are cancerous, whereas careful histological examination of large numbers of cases has shown that most of the enlarged glands found in the tissues near the growth are inflammatory.

Another fallacy which has caused confusion is that new primary growths have often been put down as recurrences. When a malignant tumour is discovered in the colon of a patient whose rectum has been removed for cancer, it must not be assumed that this is a recurrence. In all probability it is a new primary growth. Some years ago I operated upon a doctor for cancer of the rectum, and performed a complete excision. He remained quite well for six years, and then developed cancer in the base of the right lung. I expressed the view that this was probably another primary tumour. When the patient died, he left instructions that a post-mortem

examination was to be carried out and the specimen sent to me. I had this specimen very carefully examined, and we were able to prove that the second tumour was a primary cancer of the bronchus.

Although, as a rule, cancer of the rectum only occurs as a single tumour, there are numerous instances of more than one primary tumour being found in the same patient. I have on several occasions seen as many as three primary tumours in the same patient. Quite recently I had to operate upon a patient with an early carcinoma of the rectum, and when I opened the abdomen to perform a preliminary colostomy I found another primary carcinoma in the middle of the pelvic colon. Fortunately this also was an early growth, and after satisfying myself that there were no more growths and no secondary deposits, I removed it and established a colostomy. A fortnight later I removed the rectum, and the patient made an excellent recovery. Such cases are unusual, but by no means very uncommon. Norbury collected a large number of cases of multiple growths. In some cases there were several cancers in the rectum, in some a cancer in the rectum and one or more in the colon, and in some a cancer in the rectum and another in some different organ, such as the breast, larynx, or stomach. Even more interest attaches to those curious cases where, after the removal of a growth in the rectum, another primary growth develops after the lapse of some years in the same patient, either in the bowel or elsewhere.

One patient of mine had his rectum removed for cancer, and eighteen years later returned with another small growth in the colon, some 8 inches higher up. This also was successfully resected, and he is still alive, now twenty-one years since the original operation. Another patient developed a growth 11 inches higher up in the colon six years after a growth in the rectum had been removed by perineal resection. In neither case was there any evidence that the second growth was a recurrence of the first one. It had all the characteristics of a primary growth, and there were no glands involved nor any signs of secondary deposits. Another patient developed a duct carcinoma of the left breast three years after the removal of the rectum for cancer. The fourth patient also developed a duct carcinoma of the breast two years after the removal of the rectum for adeno-carcinoma. This last patient died from recurrence of the breast tumour without showing any signs of secondary growths from the rectal tumour.

Both clinical and experimental evidence seem to prove that one malignant tumour inhibits the development of another primary growth in the same individual. The cases just quoted would seem to show that the inhibitory action does not always last very long—indeed, it is questionable whether the incidence of cancer in these cases, as shown by four having developed a second growth, is much less than the normal incidence would

be for patients of this age who had not had a growth before; but the figures are too few to draw any definite conclusions.

Among my private cases are twelve patients who developed new primary growths in other situations:

Sex.	*Age.*	*Situation of Primary Growth.*	
M.	37	Rectum.	Growth in colon 18 years later.
F	68	Rectum.	Duct cancer of breast 4 years later.
M.	53	Rectum.	Growth in colon 8 years later.
F.	48	Rectum.	Cancer of breast 5 years later.
F	70	Sigmoid.	Cancer of rectum 5 years later.
M.	56	Rectum.	Cancer of bronchus 5½ years later.
F.	60	Rectum.	Cancer of transverse colon 7 years later.
F.	63	Rectum.	Cancer of stomach 5 years later.
M.	43	Rectum.	Cancer of colon 13 years later.
M.	56	Rectum.	Cancer of colon 8 years later.
M.	50	Rectum.	Cancer of pylorus 2½ years later.
F.	62	Rectum.	Cancer of uterus 8 years later.

Broder's Method of Classifying Tumours.—This method is based upon the fact that the more malignant a cancer is—in other words, the more rapidly it grows—the less differentiated will the tissues be. Tumours which show well-marked differentiation of the cells are found to grow more slowly than tumours which exhibit little differentiation and much irregularity of structure. The method consists in removing small pieces of the tumour by biopsy and examining them. The tumours are classed in four grades according to the degree of differentiation of the tissues found, the most highly differentiated tumours being classed as grade 1 and the least as grade 4. It is found that those tumours which are graded 1 show a better prognosis than the tumours in the other grades. Unfortunately a good deal depends upon the particular part of the tumour from which the specimen is taken, and this introduces rather a serious fallacy.

Examination of the Growth.—When a growth in the rectum has been diagnosed, the next step is to obtain a satisfactory estimate of the possibility of removing it, and to decide by what method this should be done. It is also necessary to check the diagnosis microscopically.

Nearly all rectal cancers can be felt with the finger, but in order to examine the growth properly the patient should be examined bimanually, lying semi-prone on the left side, the right forefinger in the rectum, and the left hand pressing firmly down from the abdominal wall into the pelvis. In this way even a high growth can be felt and its mobility tested. The extent of the growth should be investigated by sweeping the finger over it, and, if possible, reaching to its upper edge. The surgeon should press his finger upwards towards the promontory of the sacrum to see if he can feel any enlarged hard glands in the mesorectum, where they are most likely to be.

The most favourable kind of case is one where the growth is small, somewhere about the size of a shilling, on the posterior wall low down, freely movable on the deep tissues and projecting into the rectum. An unfavourable case will be one where the tumour is high up in the rectum, almost completely surrounding the bowel lumen, and is fixed.

While no serious difficulty arises in deciding that the former is operable and has a good prognosis, and the second is inoperable, there may be considerable difficulty in coming to a decision with tumours between these extremes. Fixation of the growth is an unfavourable factor, but if the fixation is to the posterior pelvic wall, it is not necessarily a serious bar to successful removal; on the other hand, fixation to the prostate or bladder in front negatives successful removal. Fixation to the posterior vaginal wall or uterus is not so serious, as these structures can be removed with the rectum.

A very extensive growth is not necessarily inoperable. There is a specimen in the museum at St. Mark's Hospital of a very large growth, which after removal was found to fall into the "A" class, as it had nowhere passed through the bowel wall. A small growth, with a deep ulcer in the centre, is often found to have already invaded the lymphatics, and, consequently, although removable, the prognosis will be unfavourable.

It is not possible to estimate with any great accuracy the stage which a tumour has reached until the tumour has been removed, and sections cut through the base have been examined. But pedunculated tumours, or semi-pedunculated tumours, are generally confined to the rectal wall, while deeply ulcerated tumours have, as a rule, passed through the rectal wall and have already invaded the perirectal tissues. When the examining finger can be passed up beyond the upper limits of the tumour we may be sure that removal by the perineal route is possible, if no serious fixation to other structures is present. If, on the other hand, it is impossible to reach above the tumour, a combined operation will be necessary for its removal.

Surgeons who have had a considerable experience with perineal excision of the rectum can often remove a tumour, the upper limits of which cannot be reached by the examining finger, by this route, but without such experience it is a good rule not to attempt the operation unless the finger can reach above the tumour.

In arriving at a decision as to the operability or otherwise of a rectal cancer we must take into account the condition of the patient himself, as well as the stage of the disease and the situation of the tumour.

The age of the patient is important. While easily accessible growths can be removed with a fair degree of safety in patients over seventy years of age by the perineal operation, high growths which would involve a combined abdominal route must be considered inoperable in patients of this age.

CHAPTER XIX

OPERATIVE TREATMENT OF CANCER OF THE RECTUM

THE earliest operation for cancer of the rectum is supposed to have been done by Paget in 1739. Lisfranc revived the operation in 1826, but it was not until the end of the nineteenth century that the operation for cancer of the rectum was performed at all frequently.

The operations of that date consisted of dissecting out the growth, together with the involved bowel, guided by a finger in the rectum. The resulting wound was left open, and the stump of the bowel discharged into it. The wound took many months to heal, and the after-results were bad. Either considerable stricture necessitating the constant passing of bougies or a prolapse which could not be controlled were the common results, and early recurrence was the rule.

The first advance on these methods was Kraske's operation, first described about 1890. In this operation the rectum was approached from behind by removing the coccyx and part of the sacrum. After freeing the rectum, that portion of it containing the growth was cut away, and the ends of the rectum were either joined together or the upper end was brought out at the top of the wound as a sacral anus. This was the method used by the Allinghams, who did a great many such operations. The results were bad. The mortality was high, mostly from sepsis and sloughing; early recurrence was the rule, and the after-condition of the patient was often little better than with the earlier operations. Nevertheless, some patients survived the operation for very many years, and could definitely be claimed as cures.

It was very obvious at the time, when I was acting as Herbert Allingham's assistant and first joined the staff of St. Mark's Hospital, that no great advance could be made till the removal of the rectum could be done under aseptic conditions, and with a reasonable prospect of avoiding sepsis of the wound afterwards.

The first great advance was when we began to do the abdomino-perineal operation in 1904. The first combined operation for cancer of the rectum aimed at bringing down the proximal end of the colon to the anus, and thus obtaining a perfect functional result with a normal sphincter control and a new rectum. I performed many of these operations, and still occasionally do one. I have one patient on whom I performed this operation in 1906 still alive, but the mortality of the procedure was too high owing mainly

to sloughing of the transplanted colon, and I soon found, as did others, that it was better to finish the operation with a permanent colostomy instead of attempting to bring the colon to the anus. This technique has now been standardized, and the modern abdomino-perineal excision was thus evolved.

The next stage in the development of operations for cancer of the rectum was the modern perineal excision. It was soon apparent that the abdomino-perineal excision, while it fulfilled many of the ideal conditions necessary for removal of the tumour, was accompanied by too high a mortality, and was not suitable to deal with a condition which occurs mainly in elderly people, who, apart from age, have often complicating disease. I therefore tried to evolve an operation which would enable a complete and thorough removal of the rectum and growth to be performed without any serious risks. The operation now known as my perineal excision was the result, and it has become the standard method of removing rectal growths. I first performed it about 1914, but a description of it was first published in 1920. This operation has reduced the operative mortality to 4 per cent. in private practice, but it remained to be seen if the proportion of cures was high enough, as compared with the more dangerous operation of abdomino-perineal excision, to justify its being used as the standard technique.

This technique quickly established itself, both at St. Mark's and outside, and became the popular operation for cancer of the rectum, so that a large body of evidence soon arose. I have myself performed over 340 excisions by this method, and there is now no doubt that the proportion of cures on a five-years basis is higher than with any other method.

No doubt improvements and better methods of operating and treating cancer of the rectum will take the place of those now performed, but at the present moment the perineal operation as here described is the standard operation for cancer of the rectum, and the abdomino-perineal operation is reserved for cases of very high growths that cannot be dealt with by the perineal route.

Indications for Operation.—This is one of the most difficult problems the rectal surgeon has to solve. A large number of factors have to be taken into consideration, and the responsibility placed upon the surgeon in advising for or against an operation, or as to which operation shall be performed, is one of the most serious that any human being can be asked to assume. Not only must he decide whether the operation shall be performed or not, but also which operation will give the patient the best chance of a successful result with the minimum of risk.

One of the factors which must be taken into consideration in advising an operation in a doubtful case is the natural duration of life in a patient with cancer if nothing at all is done. Tables worked out by Lazarus-

Barlow and Leeming show that the average duration of life from the onset of the growth to death *in untreated cases is for males* 20·4 months, and for females 25·9 months. The figures of the Ministry of Health show the average period elapsing between the first *occurrence of symptoms* and the time at which the patient comes to the surgeon is about twelve months, so that in an untreated case the expectation of life from these figures would be a little over a year from the time the surgeon first sees the patient. With a colostomy this period would probably be extended by one to one and a half years.

The advisability of operative removal will depend upon the conditions present. If the growth is comparatively small and of fairly recent origin, if it is confined to the lower rectum or the ampulla, and if the patient is not more than sixty-five and in good health, there can be no possible question that a free excision of the growth is the proper treatment, and *that it should be carried out as soon as possible. If, on the other hand,* the growth is situated at the upper end of the rectum, if it has already reached a considerable size and has become fixed, and if the patient is over sixty-five years of age and not in very good health, there can be no doubt that any attempt to excise the growth is absolutely contra-indicated. The cases which come between these two extremes will often give rise to considerable difficulty in deciding which is the best course to advise. It is hoped that the following factors may assist in arriving at a correct decision, but it must always be remembered that the personal opinion of an experienced surgeon is of infinitely more value than any number of written rules.

Age.—*Except in exceptional circumstances, no attempt should be made* to excise the growth in a person over the age of seventy. An exception may, however, be made in the case of a particularly healthy individual with a small and easily accessible growth. Some surgeons consider that if the patient is over sixty years of age this is a contra-indication to excision. Personally I do not agree with this dictum, for mere age as counted in years is not a sound criterion. One often sees one patient whose age is stated to be under fifty-five who is, as regards his suitability for operation, infinitely inferior to another whose age is sixty-five. As a general rule, however, we may say *that growths in patients over seventy years of age* should not be excised if their removal will involve a very serious operation, as the chances of success are not sufficiently good to warrant the necessary risk. In my own experience I have had a number of successful cases in patients over seventy where complete excision of the rectum has been performed. The patients have recovered from the operation, and have remained free from recurrence for a number of years.

Situation of the Growth.—Growths wi[illegible]h *of the finger are much* more favourable for removal than th[illegible] upper end of the rectum.

Unfortunately, the commonest situation for carcinoma of the rectum is the recto-sigmoidal junction, which is also the most difficult portion of the bowel from which to remove a growth, and the one in which the greatest risk is experienced. The position of the growth *per se* is not, however, any contra-indication to operation, as we are now able to remove growths successfully from any part of the rectum. But growths situated at the upper end of the rectum involve a much more serious operation for their removal than is necessarily the case with growths lower down, and the situation is therefore an important factor in deciding for or against an operation in any individual case.

The Size of the Growth and the Time it has existed.—Obviously the best results will be obtained when the growth has only been present for a short time and has not attained to any large size. When the growth has already involved a large portion of the bowel wall it becomes a difficult matter to decide whether it is worth while attempting to remove it. Much will depend upon the skill of the operator and the suitability of the patient to stand a serious operation. While, as a general rule, results are bad in the case of large growths, this is not always the case, and one of my most successful cases was that of a young man of thirty-seven from whom an enormous growth was removed which involved two-thirds of the rectum. This patient remained free from recurrence for twenty-two years. Such cases are, of course, exceptional, and certainly no attempt should be made to remove a large growth in the case of a very old person. The use of radium in the shape of radon seeds or needles, in conjunction with operation, will sometimes enable the surgeon to secure a successful result which otherwise would be impossible.

General Condition of the Patient.—This is a factor of the utmost importance, more especially when we have to deal with growths which will necessitate an abdomino-perineal excision. The operation is necessarily a severe one, and the patient whose general health is bad will have but a poor chance of surviving it. Well-marked arterio-sclerosis, chronic disease of the kidneys, a feebly acting heart, are all contra-indications to operation. But the most serious contra-indication, in my opinion, is obesity. Fat patients are bad subjects for any kind of operation, but in the case of rectal excision the presence of large quantities of fat adds so enormously to the difficulties of the operation that it renders the patients most unsuitable subjects. Moreover, fat patients heal exceedingly badly, the blood-supply to their cellular tissues is deficient, and their general vitality is, as a rule, low. Personally, I consider such patients, especially men, unsuitable subjects for abdomino-perineal excision. The difficulties of removing a growth in the upper part of the rectum in a stout man are so considerable that I think few surgeons of experience will attempt it.

Sex.—Other things being equal, the operation for excision of the rectum is far less dangerous in women than in men. The operation is nearly 50 per cent. easier in the case of women. Women stand the operation better, and their recovery is usually more rapid. This is due to several causes. In the first place, the pelvis is considerably wider in women, and there is consequently more room. The rectum is a somewhat more movable structure in women than in men. Another important factor is that in women the uterus and vagina lie in front of the rectum, and injury to these structures is not a serious complication, while their separation from the rectum is comparatively easy. In men, on the other hand, the ureters, bladder, and urethra lie immediately in front of the rectum, and their separation from it is often a matter of the utmost difficulty, while the slightest injury to any one of these structures is always a most serious complication.

The presence of secondary growths in the liver or elsewhere will, as a rule, contra-indicate any attempt to remove the primary growth, but there are, in my opinion, exceptions to this. If the growth is low down in the rectum and favourable for perineal resection of the rectum, a resection will greatly benefit the patient. A properly planned rectal resection in such a case is nearly as safe an operation as a colostomy, and will give the patient greater relief. If the deposits in the liver are quite small, they may be a long time in producing serious symptoms, and, moreover, they can, if few in number, be cut out or treated with radium. The removal of a primary growth will save the patient an immense amount of distress and pain, and will, in my experience, more than justify the performance, providing the condition of the liver is not so advanced as to threaten an early fatal issue. I have on several occasions resected the rectum in such cases with the best results, and the patient has lived as long as three years after operation in good health, and has been spared much pain and distress. An abdomino-perineal excision would not, of course, be justified under such circumstances.

Results of Treatment by Operation.—Before deciding upon such a serious matter as an operation for excision of the rectum, both the patient and his medical adviser often desire to know what are the curative possibilities of the operation; and it is quite natural that they should wish to have some definite information put before them, if possible in percentages. Unfortunately, it is exceedingly difficult to give any reliable information based on figures. In the first place, surgery of the rectum has undergone great changes and, we believe, improvements during the last few years. This fact tends to invalidate figures based on cases operated on by the older methods. It must also be remembered that in order to establish a case as cured, many years must elapse.

It used to be the fashion, and sometimes still is, to regard as cured a

patient who had passed a three years' limit of freedom from recurrence after an operation for cancer. I think all surgeons will agree that this is much too short a period, and that quite a number of cancer cases recur after three years and under five years. In fact, it is not possible to give any exact time after operation at which recurrence may not occur.

The results obtained by different surgeons vary very greatly, and their figures are nearly always based upon a different set of facts. Thus, while one surgeon bases his figures on a three years' limit, another may do so on a five years' limit. Also, it depends on the type of case chosen for operation. Some surgeons only operate on the most favourable cases, while others, like myself, believe in giving every patient a chance who has a reasonable one.

The question may be looked at in two ways: First of all, the question of operation risk, or, in other words, the operative mortality; and, secondly, freedom from recurrence.

Until about twenty years ago the operative risk was a high one, most of the deaths occurring from sepsis and shock, but great improvements in technique have been made, and the operative risk now is quite low, and will compare favourably with that of most other operations.

The operation must always be a difficult one, and really good results can only be obtained when the surgeon has had special facilities for acquiring the necessary knowledge and dexterity, and when the operation is performed in a good nursing-home or hospital where the nurses and assistants have been accustomed to what is often spoken of as " team work."

The operative risk has been very greatly reduced in recent years, and there is not now under proper conditions any very serious risk. My own figures for the years 1915 to the end of 1933 show 172 private case with seven deaths, while my total figures for the same period are 340 cases of perineal excision with twenty-eight deaths; hospital cases account for twenty-one of the deaths. This gives a mortality among the private cases of 4 per cent.

It is a little difficult to explain why the mortality should be higher among hospital cases than among the private cases, but I think it is mainly accounted for by the fact that in private patients come up much earlier, and also by the fact that they are generally in a very much better general condition; slightly better nursing and attendance, which is possible in private, may also have something to do with the result.

In cases of abdomino-perineal excision the operative mortality is very much higher, and this will always be the great objection to this operation. The mortality varies from about 15 to 30 per cent., which must always be a very serious risk, and absolutely negatives the operation except in very favourable cases.

The mortality from the combined operation in the Ministry of Health's

tables from all sources is 32 per cent. This figure is too high, as it makes no allowance for improvement in technique in recent years; 22 per cent. would be a more accurate figure at the present time.

To sum up, it may be said that, assuming the growth is in the rectum itself and can be effectually removed by a perineal operation, the chances of the patient surviving the operation, provided it is done by a skilled surgeon and under favourable conditions, are excellent, and somewhere in the neighbourhood of 97 per cent. With regard to the question of the operation being a permanent cure, this depends almost entirely on the stage at which the case has been operated upon. Assuming that the growth is small and has not involved the glands or invaded the tissues outside the rectum, the chances that the patient will be still alive five years after operation are good. Even where the chances of recurrence are not good, the operation is still well worth doing, as it will considerably prolong the patient's life and greatly promote his comfort, without involving him in any serious risk.

I have discussed the risk of recurrence of the disease, and the prognosis after a perineal excision of the rectum has been performed, further on in this chapter (see p. 352). It has to be remembered that since I have been able to reduce the mortality of the operation to so low a figure as 4 per cent. I have operated much more frequently on border-line cases, and even occasionally on cases where recurrence in the liver had already taken place. Such cases, which are included, of course, tend to make the proportion of recurrence much higher than would be the case with picked cases.

Apart from this, we have to bear in mind that our knowledge of cancer is still most incomplete. It often happens that a case which at operation appears to be an exceedingly bad risk from a recurrence point of view never gets any recurrence. Further, we must remember that the very inadequate operations for cancer of thirty years ago did not all result in recurrences, although recurrence was more frequent than it is now.

Where the growth is situated high up and can only be removed satisfactorily by an abdomino-perineal excision the risk is much greater, and unless the circumstances are favourable, both as regards the early character of the growth and the general condition of the patient, it is doubtful whether the risk is worth running in such circumstances.

At one time the general opinion was in favour of performing as extensive an operation as possible in all cases. It was quickly found, however, that this resulted in much too high an operative mortality, and, moreover, was not justified by the results. The tendency at present is to reserve the more extensive operation of abdomino-perineal resection for those cases where the tumour is situated too high up for removal by the perineal route. This attitude is an entirely common-sense one, and undoubtedly correct.

I think all surgeons now agree that a purely local excision of a rectal growth is not a sound operation, and that the entire rectum should always be removed subsequent to a preliminary colostomy. Not only is the safety of the patient greatly increased, but the ultimate result is better. An exception may possibly be made in cases of very old people with a small growth on the posterior wall or at the anus, but as a general rule there should be no hesitation in advising complete removal of the rectum in all cases, and it is only by adhering to this rule that we can hope to improve the ultimate results of operative treatment of malignant disease of the rectum.

Local excision of the growth will be described, not because it is advocated for cases of cancer of the rectum, but because it is the best method of dealing with cases of villous growth of the rectum, and is occasionally useful in cases of early malignant disease in very old persons.

The method which is recommended as a routine procedure is the perineal operation, and the abdomino-perineal excision should be reserved for exceptional cases which cannot be adequately dealt with by a perineal excision.

Those who advocated the abdomino-perineal operation in all cases as the only means of removing all the glands were arguing from false premises. One well-known surgeon, for instance, assumed that all enlarged glands found in the neighbourhood of a carcinoma of the rectum were malignant. No routine examination of these glands with the microscope was made. At St. Mark's Hospital we have for some years made a careful histological study of all enlarged glands in the neighbourhood of carcinomata, with the result that it has been found only a small proportion of such glands are carcinomatous. Most of them are only septic glands. I doubt very much whether once the lymphatic glands in the mesocolon are invaded by cancer cells any operation, however extensive, will eradicate the disease, as other cancer cells will already have travelled to distant glands quite out of reach of the surgeon.

Local Excision.

The patient is carefully prepared for operation so as to insure that the bowels shall be empty at the time. The patient is then placed on the left side in the semi-prone position, with the buttocks on the edge of the table and with the knees well drawn up. An incision is made in the middle line, starting at the lower part of the sacrum and finishing an inch behind the anus. The tissues are then freed from the coccyx, and each side of the coccyx exposed. The fibres of the glutei which arise from it on either side are freely divided, and the tissues separated from its front surface until the coccyx remains attached only to the

sacrum. After the coccyx has been removed the wound is deepened, and the rectum, having been defined, is freed as much as possible and drawn up into the wound. Forceps are attached to it to act as retractors, and it is opened well to one side of the growth, so that the incision may be through healthy tissue. That portion of bowel wall containing the growth is then cut away, a good wide margin of healthy mucous membrane being included round the growth. There is generally free hæmorrhage at this stage of the operation, and a number of vessels have to be picked up with the pressure forceps and tied off. The wound in the rectal wall must now be closed, and should, if possible, be sutured in a direction from side to side, so as to prevent any narrowing of its lumen. If this proves to be impossible, it may be sewn up in the shape of a cross. With a little freeing above it is often possible to get the upper portion to come down sufficiently to allow of its being closed without tension. The mucous membrane should be carefully stitched together, a continuous mattress suture of catgut being used. The other tissues should then be drawn together to support the line of sutures in the mucous membrane, and the posterior wound may then be sewn up, preferably with fish-gut sutures, and a large drainage-tube left in the upper end of the wound. A drainage-tube should also be inserted in the rectum to prevent tension from flatus, etc.

Healing cannot be expected to take place by primary union with certainty, and often some breaking down of the posterior wound occurs, with the formation of a fæcal fistula in this situation. If, however, the tissues have been brought together and the mucous membrane is not allowed to come into contact with the skin, healing of the posterior wound occurs fairly rapidly, and in the course of a few weeks it heals up, leaving the patient with normal control of the bowel.

Needless to say, the bowel should be examined periodically to make sure that no contraction is occurring, and if there are signs of this, bougies must be passed to counteract the tendency. I have performed a number of these operations for simple adenomata and other small growths in quite elderly people, and have had very little trouble from subsequent stricture; in fact, the operative results have been exceedingly good. Nevertheless, it must be clearly understood that this operation is not at all a good one for carcinoma. It is very suitable for cases of simple adenoma, but should only be performed for carcinoma when the growth is quite small and localized to the bowel, and a more extensive operation is for some reason or other impossible.

Perineal Excision.

This operation can be done in one stage or two. It is certainly safer to perform it in two stages, but in exceptional circumstances, if the patient is a good risk, it can be done in one stage.

First Stage.—This consists in making a permanent colostomy opening either in the pelvic colon or the left side of the transverse colon. The colostomy should be made through the left rectus muscle, as described in Chapter XXXII., p. 540. This part of the operation should be done under avertin, and local or regional anæsthesia. The colostomy is usually performed a week or ten days previous to the radical operation, and the portion of bowel between the colostomy and the anus is thoroughly washed out for some days prior to the major operation.

At the time when the colostomy is performed an opportunity is afforded of examining the growth from above, and of ascertaining whether there is any fixation of the growth, and to what extent. Also the liver should be examined to see if there are any metastatic deposits.

Second Stage.—The technique of the operation described here makes it possible to perform an absolutely aseptic operation from start to finish, and so abolish the chief cause of mortality—namely, sepsis in some form or another. Owing to the fact that the removal of the rectum of necessity leaves a large cavity which cannot be filled up except by blood-clot, primary union only occasionally occurs. More commonly there is a small cavity which heals by granulation in the course of three or four weeks. Convalescence should run an aseptic course with a normal temperature. In some cases primary union has been obtained, and the wound has remained perfectly dry after the third day. Such cases have generally been women in whom the pelvic organs readily fall backwards and fill up the cavity left by the removal of the rectum.

The Anæsthetic.—There are two things which must be aimed at completely: protection from shock in any form, and absence of vomiting after operation. Vomiting is particularly undesirable after excision of the rectum, because it tends to break down the new peritoneal floor of the pelvis and produce hernia in the wound, and it also tends to set up secondary hæmorrhage. The necessary conditions have been attained by using avertin or nembutal as a basal anæsthetic, combined with spinal anæsthesia, with either stovain, novocain, or percain. No other anæsthetic at all is used. When spinal anæsthesia is used, great care is taken to see that the patient is kept with the head slightly down from the time that the anæsthesia begins until all sensation in the legs has returned. This is, I believe, most important in protecting the patient against the effects of gravity during the time that a large part of his vasomotor system is paralyzed. As a result of this precaution there has been only a few cases of slight headache and no other bad after-effects. Local or regional anæsthesia gives equally good results, but is more troublesome, and the combination of avertin and spinal has proved the best form of anæsthesia so far tried.

One very marked advantage of this technique is that it has rendered it

possible to successfully excise the rectum of patients in whom operation by any other method would have entailed impossible risks. I have not hesitated in the last fifteen years to perform excision in patients as old as seventy-five, provided other factors were favourable, and also in cases where other serious disease was present, and so far my confidence has been justified. In my last completed set of figures there were 148 patients over sixty years of age and twenty-nine over seventy. One patient was seventy-nine years of age, and is still in good health over four years after the operation. Two patients had bad chronic bronchitis, one had albuminuria, one old-standing locomotor ataxia, one bad Graves' disease with a pulse of 130.

It has long been my view that no operation for cancer of the rectum can be considered satisfactory unless it can be used with a reasonable degree of safety in cases where the patient is a bad subject, as the majority of patients suffering from cancer of the rectum are necessarily bad subjects owing to fat, age, or complicating disease. An operative technique which requires that the patient shall be a first-class subject will either be accompanied by an appalling mortality, or will only be available for a small percentage of the cases requiring treatment.

This operation is suitable in any case where the growth is at the anus or anywhere in the rectum proper, provided that it is not fixed to important structures. It cannot be performed if the growth is at or above the recto-sigmoid junction, unless the growth is small and the sigmoid fairly lengthy.

The second operation is performed ten days after the first. The patient is not starved beforehand, nor purged; he is only deprived of breakfast on the morning of the operation.

The operation is performed in the left semi-prone position. I have always preferred this position, but some surgeons prefer a very much exaggerated lithotomy position, with the perineum pointing towards the ceiling. This latter position enables the surgeon to see better, but is liable to let blood run into the peritoneal cavity, if great care is not taken, and it is a bad position from the anæsthetic point of view. Before beginning the operation a No. 8 gum elastic catheter is tied into the bladder, if the patient is a man, in order to act as a guide to the urethra during the operation. This is not necessary in women, but the vagina should be thoroughly asepticized. I prefer to achieve this by having the vagina douched out with 2 drachms to the pint of monsol two hours before operation, and then packed with gauze soaked in the same solution. The first step in the operation is to pass a stout silk ligature round the anus subcutaneously with a curved needle. This is easily and quickly done by entering the needle in front and bringing it out behind the anus; then re-entering it at the same spot and bringing it out again where it first

entered. This is tied up tightly so as to exclude the anus entirely (see Fig. 145). After this the skin all round is thoroughly painted with iodine, and the towels are put in place. The surgeon does not wash up or put on his gloves until after he has closed the anus. The incision is made starting from the base of the sacrum, and carried forwards in the midline surrounding the anus, and well clear of it, to meet about 1½ inches in front. This incision is then deepened, cutting well away from the rectum into the fat of the ischio-rectal fossæ. The coccyx is disarticulated, or in case this should not give room enough, some of the sacrum is removed.

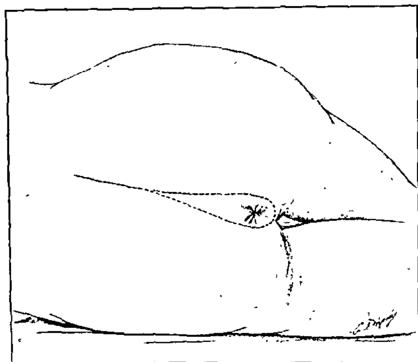


Fig 145.—Showing the Anus closed by a Stitch
The dotted line shows the incision.

The best method of disarticulating the coccyx is, after exposing it, to bend it forwards with the left thumb, and then with a knife it can be quite easily and rapidly detached from the sacrum. The deep fascia is opened just in front of the sacrum, and the first finger of the left hand is passed deep to the left levator ani muscle (Fig. 146), and the latter cut well away from the rectum with scissors. The same is then done on the right side. The next step is to dissect the rectum away from the prostate or vagina in front. This is easy in the female, but rather difficult in the male. This part of the dissection must be done boldly with scissors, care being taken not to injure the rectum, as this would involve a septic wound.

The septum between the rectum and the vagina in the female is often very thin, and care must be taken to keep close along the posterior vaginal wall. A finger occasionally passed into the vagina is of great assistance during this part of the dissection. In the male the dissection must be kept close to the posterior urethral wall. The position of this structure is indicated by a gum elastic catheter which has been tied into the bladder;



FIG. 146.—PHOTOGRAPH OF PERINEAL EXCISION, SHOWING SEPARATION OF THE RECTUM LATERALLY.

The surgeon's left forefinger (F) has been pushed beneath the left levator muscle, and between it and the rectum, and is guiding the lower blade of the scissors. S, Perianal skin; A, skin of left buttock drawn back.

it will be possible to feel the catheter through the tissues, and it acts as a guide during this part of the dissection.

After the wound in front of the anus has been deepened for about 2 or 3 inches the lower edge of the prostate will be reached, and it will then usually be found that the rectum will strip away from the prostate quite readily. The rectum should be stripped backwards, baring the lower surface of the prostate until the two vesiculæ seminales come into view. The stripping should then be continued, aided by blunt dissection

with closed scissors, so as to separate the rectum from the two vesiculæ. It is most important at this stage that the dissection should not be taken up between the prostate and the vesiculæ, as, should this happen, the trigone of the bladder will almost certainly be opened, as it lies immediately in front. After the vesiculæ and the vas deferens on each side have been separated from the rectum, the lower portion of the peritoneum should be reached. This should be picked up with a pair of



Fig. 147.—Photograph of the Rectum (R) being Separated from the Prostate (P) and Urethra (U) in the Male.

The central tendon passing from the rectum to urethra and bulb is a useful guide; *after its division the urethra can be felt in front (see Fig. 148).*

forceps. It will generally be quite obvious, and should be opened with a snip of the scissors. After the peritoneum is opened a large gauze pack with a tape attached to it is pushed into the peritoneal cavity to prevent any blood getting in, and to protect the intestines. The peritoneum on each side should now be divided towards the back along each side of the rectum and close to it. The rectum and the growth are now free, except above and for the mesorectum behind. The rectum is now drawn forward and the mesorectum defined. It should be divided as

The anterior dissection in the female is much simpler than in the male. The peritoneum is usually reached within 2 inches of skin, and after it is opened the bowel can be separated very readily. Difficulty, however, may be met with in some cases from the fact that in some women the lower end of Douglas's pouch is very much higher than usual, or may even be entirely obliterated from adhesions due to some previous inflammatory mischief. If this is expected, great care must be taken in dissecting the rectum from the upper part of the vaginal wall. As a rule, however, there is no difficulty about this part of the dissection.

Special Points in performing the Operation.—1. A good light which can be directed into the wound is very important.

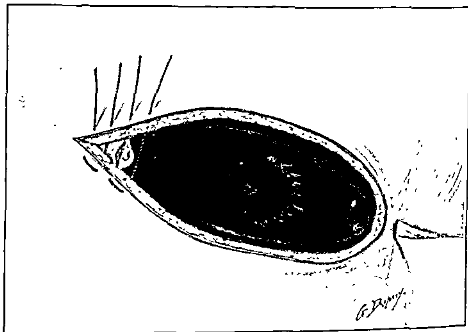


Fig. 151.—The Completion of the Operation.

The end of the bowel has been closed and invaginated, and the peritoneum sewn up. The skin wound is being closed with mattress stitches.

2. In performing the anterior dissection the surgeon must keep as close as possible to the posterior vaginal wall in women, and to the urethra and prostate in men. It is for this reason it is so important to have a hard catheter tied into the bladder.

3. On no account must the surgeon get in front of the vesiculæ seminales, as he will probably injure the bladder. These structures can be easily seen, and the peritoneum will lie just behind them and between them and the rectum.

4. The peritoneum should be opened as soon as reached and divided close to the rectal wall, and this will prevent any risk of damage to the ureters.

5. The mesorectum and its vessels should be divided as high up as possible, and the vessels all tied off before the bowel itself is divided.

6. *In stitching up the peritoneal floor it is very important* to make certain that no gap is left through which a hernia could come down. If there is any doubt about being able to do this, it is better to pack the cavity and not attempt to close the peritoneal floor, as there is nothing so dangerous as a small gap left in the new peritoneal floor, and there have been a number of cases of strangulated hernia resulting from failure to observe this precaution.

7. If the growth is large or rather high up, and there is difficulty in



FIG. 152.—PHOTOGRAPH OF THE OPERATION COMPLETED WITH WICK DRAIN IN PLACE.

removing the rectum, another $1\frac{1}{2}$ inches should be removed from the sacrum with a chisel. If possible, the periosteum on the anterior surface should be preserved, so that the bone will reform.

After-Treatment.—The patient is generally out of bed in fourteen days, and usually able to return home in three weeks to a month. Ordinary solid food is given from the start.

It is generally found necessary to change the dressings after forty-eight hours, and the strictest antiseptic precautions should be observed. At the end of three days the *cigarette drain* should be removed, a stitch cut, and a large empyema-tube introduced into the wound. This need not

go in for more than 3 inches, and should have a flat flange so as to retain it on the outside of the wound. Unless the wound becomes infected, it is better not to irrigate the cavity. The stitches should be removed on the twelfth to fourteenth day. After that, the patient may be got up into a hip-bath with a ring cushion to sit upon. The bath should be repeated each day thereafter, and the patient encouraged to walk about. As a rule he is able to get about by himself in three weeks, and is generally able to return home during the following week. In women the wound heals very rapidly, but in men, owing to the fact that there is a large cavity, a drainage-tube will have to be retained, generally from six to eight weeks after operation. This tube should be shortened very gradually, so as to enable the cavity to close completely before the opening in the skin is closed.

My reason for not using a drainage-tube to start with is that no amount of care will prevent air getting into the wound and infecting the blood-clot, which must be present in the cavity left by the removal of the rectum. By keeping the wound cavity closed during the first few days, except for a cigarette drain, air cannot get into the cavity, and aseptic granulations are able to form on the walls of the cavity, and will then act as a protection against sepsis. In men, where the cavity left is large, I often pack the wound with rubber tissue and sew up over it, some of the stitches being removed and the packing withdrawn on about the fourth or fifth day.

If the operation is properly performed, sepsis should not occur in the wound. In most cases the wound has to heal by granulation, as the walls of the cavity cannot be brought into apposition. Healing, however, will generally take place in the matter of a few weeks.

It is not desirable to flush out the cavity with strong antiseptics, as this merely damages the granulation tissue.

Complete removal of the rectum, whether by the abdomino-perineal or perineal route, almost of necessity causes a certain amount of damage to the sympathetic nerve supply of the bladder and prostatic urethra. The extrinsic nerves of the bladder come from the hypogastric ganglia, into which both sympathetic and parasympathetic fibres pass, derived from the anterior primary divisions of the second and third sacral nerves. The nerve fibres passing to the bladder come off the hypogastric ganglia in five or six strands of fibres. The main mass of fibres is described as the presacral nerve, though, in fact, it is generally a plexus or network of fibres; it passes down to the level of the first part of the sacrum, where it divides, and the fibres join up with ganglia situated on either side of the rectum. It follows that some damage to these ganglia is more than likely to result from surgical removal of the rectum. It appears that the results are chiefly due to damage to the inhibitory fibres which enable relaxation of the sphincter vesicæ to take place. At any rate, retention of urine

and spasm of this muscle are the most usual consequences of the operation. In some cases of removal of the rectum these nerves appear to escape damage, as there is no retention for more than a day or two. More often partial retention and inability to voluntarily empty the bladder persists for some time, occasionally for several weeks. In all the cases that have come under my own observation, which now amount to several hundreds, the normal function of the bladder has been completely restored, and the patient able eventually to empty his bladder normally. We must conclude, I think, that the sympathetic nerve supply is re-established in course of time.

In those cases where the patient has an enlarged prostate at the time of operation the symptoms are naturally much accentuated, and the ability to empty the bladder cannot be re-established. The operation acts as the last straw, and the prostate either has to be removed, or the obstructing lobe removed by diathermy, before normal micturition can be established again. Apart from an enlarged prostate, normal micturition returns in a matter of two or three weeks.

During the period that retention of urine is present the danger of the patient getting an infected bladder is serious, and this risk can only be avoided by the greatest care.

A tied-in catheter is retained for three or four days, or longer if necessary. It has been found extremely difficult to prevent infection of the

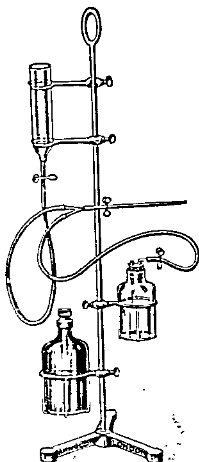


FIG. 153.—DUKES'S APPARATUS FOR ATTACHMENT TO THE RETAINED CATHETER IN USE AT ST. MARK'S HOSPITAL.

Instructions—To release urine, open bottle clip and catheter clip and urine will flow into collecting bottle. Close both clips.

To wash out the tubing, first see that catheter clip is closed, then open antiseptic clip and bottle clip. Antiseptic will run from reservoir to Y shaped junction and back to collecting bottle. When tubing is full of antiseptic, close both clips.

To irrigate the bladder, first fill up the antiseptic reservoir with *warm* oxycyanide solution (1 in 5,000) from the reserve bottle. Raise the reservoir a few inches above the bed and notice level of antiseptic. Open antiseptic clip and catheter clip and let fluid run into bladder. As soon as the patient begins to feel discomfort, close antiseptic clip and open bottle clip, and fluid from the bladder will run into collecting bottle. Wash out tubing.

bladder, but the tied-in catheter is more effectual in preventing infection than regular catheterization. As a rule the patient is able to pass urine after two or three days without assistance, but when the retained catheter is removed, a catheter should be passed each evening for the first day or two to make sure that there is no residual urine. Even after that the patient should be watched carefully to prevent recurrence of the retention, which almost inevitably leads to cystitis. Of recent years we have been using an apparatus invented by Cuthbert Dukes of St. Mark's Hospital. This is attached to the retained catheter. The main feature of it is that the entire tubing and catheter are kept filled with a weak oxycyanide solution, so that there is no stale urine in the tubes or catheter. The apparatus is easy to use (Fig. 153), and it has been found possible to prevent infection in the great majority of cases by means of it. It also has the great advantage that it makes nursing extremely easy, as the bladder can be emptied at any time, if necessary without waking the patient. Careful tests of the urine should be made for two or three days to see whether any infection has occurred. In the event of a cystitis the bladder should be washed out at regular intervals. Urinary antiseptics have been found of little, if any, value, and in many cases they increase the patient's discomfort. In women there is greater difficulty, as infection of the bladder is much more likely to occur.

The liability to bladder infection in these cases is probably considerably contributed to by the slight damage to the sympathetic nerve supply of the bladder resulting from the operation. As a rule, this disability passes off after a few days or weeks. In a few cases, where a very high growth has been removed, more serious difficulty may be experienced.

I have seen nocturnal incontinence in several instances. In one case it lasted for some two or three months, and in another case for about six weeks. There was no incontinence at all during the daytime, but more or less complete incontinence when the patient was asleep.

Abdomino-Perineal Excision.

Preparation of the Patient.—This operation is one of the most formidable in surgery, and as in the vast majority of cases it has to be performed on elderly subjects, it is essential that it should be carried out under the most favourable auspices as regards the preparation of the patient, facilities for performing the operation with the least possible delay, and the after-treatment of the patient. The operation should not be performed in a private house, except under very special circumstances, nor in any place where any of the facilities for modern operative surgery are lacking. A sufficient number of first-class nurses should be available, and for the first week or two, at any rate, it will be necessary for the patient to have a nurse in constant attendance day and night.

Most of these patients with cancer of the rectum are suffering at the time when the operation has to be performed from a certain amount of obstruction of the bowels, and consequent auto-intoxication. It is therefore essential that several days, preferably a week or more, should be expended in getting the bowels thoroughly empty, and, in so far as this is possible, asepticizing the alimentary tract. This is best done by mild daily aperients, aided by enemata, and the administration of charcoal and Kerol by the mouth. The patient's general condition should be carefully inquired into, an examination made of the urine, the teeth overhauled for carious stumps, and careful attention given to getting the mouth into as clean a condition as possible by means of antiseptic mouth-washes. It is a good plan to administer small doses of strychnine hypodermically for several days previous to operation. The patient's diet should be nourishing, and chosen with a view to avoiding an excessive residue. As has been mentioned, if definite chronic obstruction is already present, and it is not possible thoroughly to clear the bowel, a preliminary colostomy should be performed. In all cases I insist on forty-eight hours' complete rest in bed after all preparatory treatment before the operation is performed. This insures that all bad effects from purgation, etc., have passed off before the day of operation. The patient should have plenty of water the day before operation, and a little sugar is advisable.

An ordinary general anæsthetic is not advisable in these cases, and *some form of shockless anæsthesia should be used. The ideal method* would seem to be a high spinal anæsthetic with percain and avertin, ether and chloroform being avoided. It is important that the anæsthetic should be very carefully given, as the result will depend a great deal upon this factor.

The patient's blood should have been tested prior to operation to ascertain in which blood group he or she comes, and a suitable blood donor arranged for, so that if necessary the patient can be transfused after the operation is completed. Some surgeons prefer to transfuse the patient before operation, but I prefer to do this afterwards.

Patients are very difficult to lift after this operation, and are unable to assist themselves. It is therefore advisable that they should be on a fairly high and narrow bed.

The Operation.—It is advisable, if possible, to have two assistants, one of whom should superintend the getting of the patient into position at the beginning of the operation, and should also be prepared to put him in the correct position at the second stage. The operating-table must be one which admits of the full Trendelenburg position. If the patient is a male, it is essential that a gum elastic catheter of suitable size should be tied into the bladder.

The patient is first placed in the full Trendelenburg position, and arranged so that a good light can be thrown into the lower part of the

pelvis. The abdomen is opened in the midline from the symphysis pubis to well above the umbilicus. The liver having first been examined to make sure that there are no secondary deposits which would negative the operation being performed, the intestines are pushed up out of the way, so as to leave the pelvis as free as possible, and are held there by large flat swabs, to which clips have been fixed, to prevent any possibility of their being left behind in the abdomen. A towel is clipped to the edges of the wound on each side, or fixed with mastic, so that all the skin surface is covered, and I believe this assists materially in obtaining an aseptic result. A large bladder retractor is next passed down into the anterior part of the wound to pull the bladder forwards and expose the lower part of the pelvic floor. If the patient is a female, it is often preferable to seize the fundus of the uterus with vulsellum forceps, and draw this upwards and downwards. These forceps are held by a nurse or the second assistant. The growth is then carefully examined, and the exact steps of the operation planned out. The mesosigmoid is put on the stretch by the assistant, and the surgeon, by blunt dissection with a pair of dissecting forceps, searches for the inferior mesenteric artery. This should be located, if possible, just above its bifurcation (Fig. 154). This vessel is then tied and divided above the bifurcation, the veins being tied off at the same time. The remainder of the mesocolon should then be divided back to the sacrum.

The next step in the operation is to divide the sigmoid colon. It is better to do this as low down as possible, so that there will not be too much bowel pushed down into the pelvis when closing the peritoneal floor. Any surplus left on the upper stump can easily be removed after the colostomy has been established. It is better also to divide the colon at an early stage in the operation, as it somewhat facilitates access to the pelvic floor. The bowel should be well isolated with towels, and then divided between clamps with a Paquelin cautery, the ends being inverted by means of a Mickulicz stitch in the same way as in dealing with the stump of the rectum.

A considerable saving of time can be obtained by using a Martel's or similar clamp for the division of the colon. This clamp has no handles, and is quite short, so that it occupies very little room. The central part of the clamp is removed, and the colon burnt through with the cautery. The two ends are kept effectually closed by leaving the clamps on. The lower clamp is pushed into the pelvis with the tumour, and the upper one is brought out of the abdomen with the bowel used to form the colostomy. An ingenious clamp which answers the same purpose has been devised by Dudley Smith of San Francisco. The next step is to divide the peritoneum on the outer side and to define the left ureter. This is sometimes a matter of considerable difficulty. The ureter should not be dissected out,

as this might endanger its blood-supply; but it must be kept in view during the whole of the first stage of the operation, and carefully located to prevent any possibility of injuring it. Should the growth extend over towards the right side of the pelvis, the right ureter should similarly be defined. As a rule, however, there is little danger of damaging the right

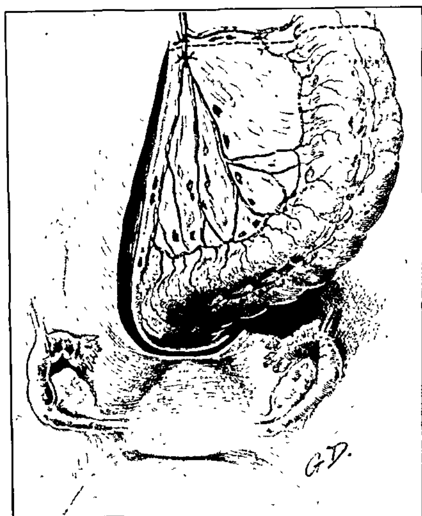


FIG. 154.—ABDOMINO-PERINEAL RESECTION, SHOWING THE INCISION IN THE POSTERIOR PERITONEUM AND THE LINE OF DIVISION OF THE MESOSIGMOID AND COLON (DOTTED LINE).

ureter. The packing is now removed from the pelvis, and with a good light the surgeon begins to divide the peritoneal floor on each side of the mesosigmoid and rectum, passing between the rectum and bladder at the bottom of the pelvis. This is best done with a long pair of scissors with cross-over handles. Everything is cleared right down to the bone behind the bowel, and its lateral attachments below the peritoneal reflection are

pelvis. The abdomen is opened in the midline from the symphysis pubis to well above the umbilicus. The liver having first been examined to make sure that there are no secondary deposits which would negative the operation being performed, the intestines are pushed up out of the way, so as to leave the pelvis as free as possible, and are held there by large flat swabs, to which clips have been fixed, to prevent any possibility of their being left behind in the abdomen. A towel is clipped to the edges of the wound on each side, or fixed with mastic, so that all the skin surface is covered, and I believe this assists materially in obtaining an aseptic result. A large bladder retractor is next passed down into the anterior part of the wound to pull the bladder forwards and expose the lower part of the pelvic floor. If the patient is a female, it is often preferable to seize the fundus of the uterus with vulsellum forceps, and draw this upwards and downwards. These forceps are held by a nurse or the second assistant. The growth is then carefully examined, and the exact steps of the operation planned out. The mesosigmoid is put on the stretch by the assistant, and the surgeon, by blunt dissection with a pair of dissecting forceps, searches for the inferior mesenteric artery. This should be located, if possible, just above its bifurcation (Fig. 154). This vessel is then tied and divided above the bifurcation, the veins being tied off at the same time. The remainder of the mesocolon should then be divided back to the sacrum.

The next step in the operation is to divide the sigmoid colon. It is better to do this as low down as possible, so that there will not be too much bowel pushed down into the pelvis when closing the peritoneal floor. Any surplus left on the upper stump can easily be removed after the colostomy has been established. It is better also to divide the colon at an early stage in the operation, as it somewhat facilitates access to the pelvic floor. The bowel should be well isolated with towels, and then divided between clamps with a Paquelin cautery, the ends being inverted by means of a Mickulicz stitch in the same way as in dealing with the stump of the rectum.

A considerable saving of time can be obtained by using a Martel's or similar clamp for the division of the colon. This clamp has no handles, and is quite short, so that it occupies very little room. The central part of the clamp is removed, and the colon burnt through with the cautery. The two ends are kept effectually closed by leaving the clamps on. The lower clamp is pushed into the pelvis with the tumour, and the upper one is brought out of the abdomen with the bowel used to form the colostomy. An ingenious clamp which answers the same purpose has been devised by Dudley Smith of San Francisco. The next step is to divide the peritoneum on the outer side and to define the left ureter. This is sometimes a matter of considerable difficulty. The ureter should not be dissected out,

as this might endanger its blood-supply; but it must be kept in view during the whole of the first stage of the operation, and carefully located to prevent any possibility of injuring it. Should the growth extend over towards the right side of the pelvis, the right ureter should similarly be defined. As a rule, however, there is little danger of damaging the right

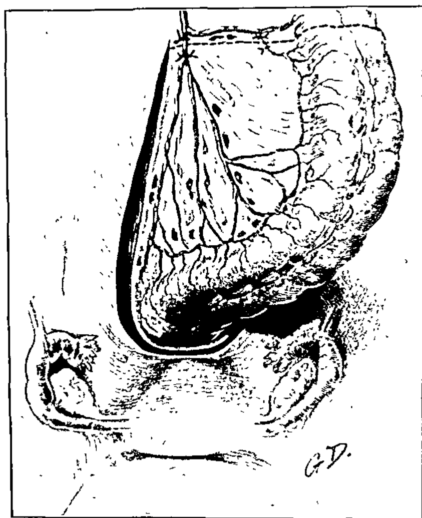


FIG. 154.—ABDOMINO-PERINEAL RESECTION, SHOWING THE INCISION IN THE POSTERIOR PERITONEUM AND THE LINE OF DIVISION OF THE MESOSIGMOID AND COLON (DOTTED LINE)

ureter. The packing is now removed from the pelvis, and with a good light the surgeon begins to divide the peritoneal floor on each side of the mesosigmoid and rectum, passing between the rectum and bladder at the bottom of the pelvis. This is best done with a long pair of scissors with cross-over handles. Everything is cleared right down to the bone behind the bowel, and its lateral attachments below the peritoneal reflection are

divided with scissors. This part of the operation is difficult, as it is at a great depth in the wound. A really good light is essential. On the left side great care must be taken in avoiding the ureter, especially if there is any extension of the growth in this direction (see note *re* ureter later on). The bowel and growth are now carefully separated from the bladder in front, though this separation need not be taken very far downwards; behind it may be carried down as far as can be felt along the bone in the hollow of the sacrum. By the ligature of the inferior mesenteric artery the blood-supply to the posterior part of the pelvis has been almost cut off, so that little bleeding is likely to occur. What does occur only comes from anastomosing vessels at the sides of the pelvis, and is of little consequence.

In the female this stage of the operation is a good deal easier than in the male, as the peritoneal floor extends much lower down. Douglas's pouch should be divided across the bottom. A bladder retractor, such as the one illustrated in Fig. 155, will be found useful. The chief difficulty at this stage of the operation lies in the division of the lateral attachments

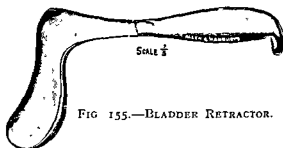


FIG 155.—BLADDER RETRACTOR.

of the rectum. These are felt as lateral bands firmly holding the bowel to the sides of the pelvis. They may be freely cut through with scissors, but care must be taken not to damage the bowel itself, and on the left side especially not to damage the ureter, which must be most carefully defined at this stage of the operation. The dissection should be carried down to the upper surface of the levator ani muscle on each side. If the bowel is not entirely freed laterally at this stage, considerable difficulty will be experienced during the next part of the operation. The lower stump of bowel is now pushed down into the wound formed at the bottom of the pelvis, and the peritoneal floor of the pelvis is re-established over it (see Fig. 156) by carefully suturing the edges of the peritoneum. It is better not to attempt to close the pelvic floor rather than to leave one small portion of it through which small bowel can pass down and become strangulated. If it is not possible completely to get the parts together, flaps of peritoneum must be turned down from the bladder or elsewhere to fill the gap. In the female the uterus and broad ligaments may be drawn in to assist in re-establishing the floor of the pelvis. If the peritoneum is separated on each side from the pelvic floor with the finger,

assisted by a blunt pair of scissors, there is seldom any difficulty in getting it to close in the gap in the pelvic floor without tension (Fig. 157).

The next step is to deal with the upper end of the bowel and establish a permanent colostomy. An incision should be made to the left side of the abdomen, and just below the umbilical level about 2 inches away from the central abdominal incision. This incision should be carried right through the abdominal wall, and should be just large enough to comfortably take the bowel without constricting it. A long pair of forceps



FIG. 156.—PHOTOGRAPH OF ABDOMINO-PERINEAL EXCISION; CLOSING THE PERITONEAL FLOOR.

U, Uterus; O, ovary; C, colon.

is passed through the opening from outside; the lower end of the colon is caught and dragged out through the incision.

Some surgeons bring the stump of the bowel through the main abdominal incision, but I think it is a safer plan to bring it out through a separate incision, as there is thus less chance of the abdominal wound getting septic when the bowels have to be opened, which may occur in a day or two (see Fig. 158).

Care must be taken in establishing the colostomy to make quite sure that

there is a good blood-supply to the bowel that is just outside the abdominal wall.

The next step in the operation is to establish a temporary cæcostomy by the method described on p. 552. While this is not absolutely necessary, it renders the operation much safer, and does not involve more than an extra six minutes.

All blood having been carefully removed from the abdominal cavity, and a final look round having been given to make sure that everything

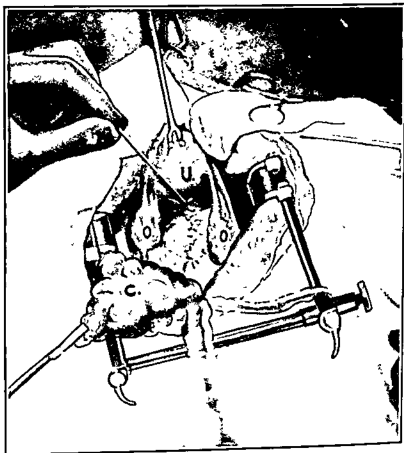


FIG 157.—PHOTOGRAPH OF ABDOMINO-PERINEAL EXCISION, SHOWING PERITONEAL FLOOR CLOSED.

is all right, the abdomen should be carefully closed in layers and temporary dressings applied. Drainage of the abdominal cavity should not be necessary.

Second Stage of Operation.—After the table has been lowered half-way the patient is turned into the left semi-prone position, with the buttocks at the edge of the table. The parts round the anus having been carefully cleaned and the anus closed by a purse-string suture, a new incision is made, starting over the base of the coccyx and passing forwards towards

the anus, where it divides to surround this opening and meet again in the perineum (see p. 328). This incision is now deepened posteriorly, and the coccyx disarticulated. The operation is continued in exactly the same way as in performing the perineal excision described on p. 327. The levator ani muscles are divided as close up to the pelvis as possible, and the rectum freed in front from the vagina in the female and the prostate in the male. On reaching the upper level of the prostate, communication

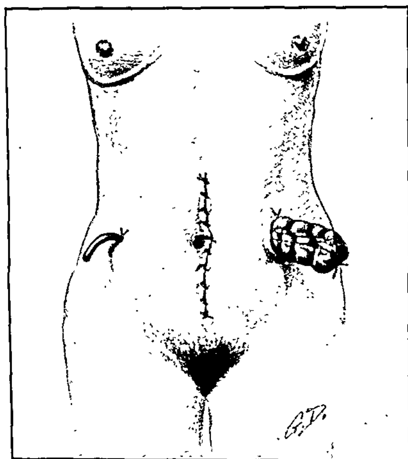


FIG. 158.—ABDOMINO-PERINEAL RESECTION: OPERATION COMPLETED.

with the upper wound will be established, and the bowel will be found to be completely loose and can be removed. The large cavity now left is carefully searched for any bleeding-points, which should be ligatured. Everything being satisfactory, the wound is now sewn up again, a cigarette drain being left in the middle of the wound. Some surgeons prefer to pack the wound with gauze or rubber tissue.

The posterior wound is now dressed, and the patient turned on to his back. The abdominal wound should then be redressed, and permanent

dressings put in place before allowing the patient to leave the theatre. If possible, the colostomy should not be opened for several days after the operation, but this, of course, must depend upon circumstances. When opened, a Paul's tube and thin rubber tube should be attached to the stump of the colon to prevent contamination of the wound. When a temporary cæcostomy has been established, the colostomy opening can be left closed for a week.

Special Points to be observed in performing the Abdomino-Perineal Operation.—1. It is most important that the inferior mesenteric artery should be ligatured in the right place; for should the large inferior hæmorrhoidal branches not be controlled, very severe and alarming hæmorrhage will occur during the lateral separation of the bowel from the abdomen, and will be exceedingly difficult to deal with.

2. One of the most serious difficulties lies in avoiding injury to the ureters. Cutting through the ureter is a most serious complication, and will almost certainly necessitate subsequent removal of the kidney. The left ureter is the one most frequently damaged, and this should be carefully traced right down to the bladder, and its position verified from time to time during the whole of the first stage of the operation. As a rule the right ureter runs no risk of damage. But there is an exception in the case of a growth in which there is extension towards the right side. When the growth is situated at the recto-sigmoidal junction, there is often a considerable amount of contraction occurring in the tissues just around the growth, and this may cause a loop of ureter to be dragged out of its normal anatomical position and to be displaced considerably towards the growth. I feel confident that in the cases in which the ureter has been damaged it has often been due to this cause. On one occasion, when tracing the ureter, I was surprised to find a regular loop running almost up to the growth, and it is quite certain that, had this not been seen, the ureter would have been cut through in two places without my having gone into the apparently dangerous zone. I have tried catheterizing the ureters before the operation, but this will not prevent the ureter being damaged in cases where it is doubled or kinked, as in all probability it will be impossible to pass the ureteral catheter past the bend. The only safeguard lies in careful tracing of the ureter, and a constant watch to see that it is not being damaged. Should the ureter be damaged during the operation and the fact detected, it should be freed and the upper end carefully implanted into the bladder. If the injury to the ureter is not detected until later, there will be no alternative but to remove the kidney on the injured side. As an alternative to grafting the ureter into the bladder in cases where it has been cut, the proximal end of the ureter may be ligated. Providing the kidney is healthy and the other kidney functioning properly, there will be no trouble, and the affected kidney will atrophy

without causing a hydronephrosis. I have done this on two occasions quite successfully, but it is better when possible to graft the ureter to the fundus of the bladder.

If the damage to the ureter is not discovered till some time after the operation, removal of the kidney will almost certainly be necessary.

3. It is well to bear in mind that, unless the pelvic floor can be completely and properly closed, it is far better not to attempt to close it at all. If it is not closed at all, there is no risk of hernia; but if a small opening between two stitches is left, small bowel may get through this opening and become strangulated, with fatal results. This has occurred several times with different operators. The pelvic floor must therefore be very carefully sutured, or it had better not be closed. In the female the closing of the pelvic floor is fairly easy, as the uterus can be used to fill in the gap. In the male it is sometimes a matter of great difficulty. The closing of the pelvic floor is not absolutely necessary, and excellent results have been obtained without this being done. The main advantage, however, of closing the pelvic floor is that, should sepsis occur in the posterior wound, which is not an unusual event, there is no danger of a subsequent peritonitis.

There are a great many modifications of this operation, and the description given here is that which I have mostly used myself. Ernest Miles has been one of the pioneers of this operation, and his technique is practically the same. Some of my colleagues at St. Mark's prefer to perform the operation the other way round, and do a perineo-abdominal operation. They claim that the operation can be more easily performed, and is attended with less risk. If performed as a two-stage operation with preliminary colostomy, this is quite a sound modification, as the abdomen can be explored when the colostomy is performed. But as a one-stage operation it is bad, as secondary metastases in the liver or serious involvement of the bladder or other structures, which render the operation impossible or useless, will not be detected till too late.

After-Treatment.—This is the same as for perineal excision. The patient should be fed with ordinary food as soon as he or she is capable of digesting it; plenty of water should be given, either by the mouth or, if this is impossible, by the colon.

The posterior wound will require dressing twice a day to make sure that it is kept clean. If there is a rise of temperature, the posterior wound should be washed out and proper drainage established.

In the case of an operation on a man it is often impossible to establish a good pelvic floor, and the peritoneum will require some support. The best thing for this purpose is to pack the upper part of the posterior wound from behind lightly with rubber tissue, which is very much preferable

to gauze. This prevents the giving way of the new peritoneal floor, and is a valuable safeguard. It should be removed in about four or five days, and a large drainage-tube substituted.

During the first twenty-four hours after the operation, saline solution should be administered either subcutaneously or by the tube in the cæcum. Three or four pints should be administered during the twenty-four hours. Morphia or heroin should be given to keep the patient as quiet as possible and to prevent pain. These drugs have also a most beneficial effect in allaying shock, and personally I consider them of the utmost value as a means of combating shock in these cases. Stimulants which tend to raise the blood-pressure should not be administered unless absolutely necessary, for they do little good, and tend to cause hæmorrhage from the wound. Complete primary union of the posterior wound is not to be expected. This is partly due to the fact that, owing to the extensive removal of tissue and to ligature of the vessels which this necessitates, a certain amount of sloughing of the cellular tissue results, and causes a brownish, offensive discharge which interferes with primary union, and to the fact that there is a large cavity which has to fill in.

The patient is got out of bed as soon as the abdominal wound is healed, and is allowed to sit in a bath daily. This hastens the healing of the posterior wound, and materially diminishes the period of convalescence.

This operation is a serious one, and requires a considerable amount of very careful after-treatment in order to lead the case to a successful conclusion. After the initial shock of the operation is over it is most important to administer nourishment freely, and to do everything possible to build up the patient's strength.

Two-Stage Methods of performing Abdomino-Perineal Operation.—The obvious advantages of being able to perform abdomino-perineal excision in two stages has led to several attempts to modify the operation in this direction. Rankin advises division of the colon at the first stage, establishing a permanent colostomy with the proximal end, and closing up the distal end and leaving it in the bottom of the pelvis. Lahey advises a different procedure. After using the proximal end of the colon to form a permanent colostomy, he brings the distal end out of the end of the abdominal incision just above the pubes. At the second operation this lower end is closed with stitches and dissected out of the abdominal wall. I have tried these modifications and have found neither satisfactory. The closed end of the colon in Rankin's method becomes adherent to other structures before the second operation, and considerable time may be wasted in separating it. Lahey's method involves sepsis at the beginning of the second stage, which it is most desirable to avoid. The best method I have found is to close the distal end of the colon and leave it in the lower end of the abdominal incision, as in Lahey's method. This closed end is

easily dissected out of the abdominal wall at the second operation, and as it is firmly closed already, no sepsis is involved.

Coffey's Operation.—This is an abdomino-perineal excision in two stages. At the first operation a colostomy is performed and the superior hæmorrhoidal vessels tied. The bowel is divided and the distal stump inverted into the rectum. A large coffer-dam drain is put down to the bottom of the pelvis and the peritoneum sewn up outside it. At the second operation the whole of the rectum and inverted sigmoid are removed. The result of this operation is to leave a large cavity in the situation of the rectum which also drains on to the abdominal wall. It is claimed for this procedure that the mortality is lower than with an abdomino-perineal in one stage, and as the actual removal of the bowel occurs at a later stage, when the peritoneal cavity need not be interfered with, it is less difficult than the ordinary standard operation. The obvious objections are that, owing to the fact that the blood-supply of the rectum has been ligatured at the first operation, the rectum and stump of the sigmoid slough, and the second operation is performed with the tissues in a thoroughly septic and gangrenous condition. Further, that a large septic wound is left to heal, and healing is very slow and tedious. This operation does not appear to me to offer any advantages over the usual abdomino-perineal method, except that it is not so difficult.

Abdomino-Perineal Excision with Restoration of the Rectum.—The original idea in planning the abdomino-perineal excision was to enable the continuity of the rectum to be re-established by bringing the stump of the sigmoid down, and either joining it to the rectum or bringing it through the anus and stitching it to the perianal skin. It was, however, soon found by surgeons that this was too risky. Large portions of the colon frequently sloughed, however much care was taken, and the results were often disastrous, although occasionally a very satisfactory result was obtained with complete restoration of function. Even where good results occurred it was found that early recurrence was all too frequent. For these reasons surgeons very soon gave up attempting to re-establish the rectum, and the operation as described, with the formation of a permanent colostomy, has practically become the rule.

I have on many occasions performed this operation and obtained complete and satisfactory restoration of function. One of my patients was alive and well fifteen years afterwards. But I seldom perform it now, as I consider the risk is too great to make it justifiable. Lately there has been an attempt to revive it again, and I shall therefore describe it.

Instead of dividing the colon during the early part of the abdominal stage of the operation, it is completely freed posteriorly, its blood-supply being carefully preserved; then all the slack bowel is pushed down into the posterior part of the pelvis, and the peritoneal floor is re-established

by carefully suturing the peritoneum round the upper part of the sigmoid, great care being taken to see that no opening is left at the sides of the bowel. The abdominal wound is then closed after establishing a temporary cæcostomy or colostomy, and the second stage is performed as follows: The anus is first tied off, and an incision made from the base of the coccyx to the posterior margin of the anus, dividing the sphincter posteriorly. The rectum and anus are then completely dissected out

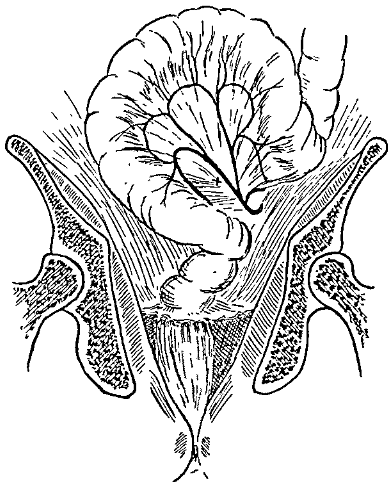


FIG. 159.—DIAGRAM SHOWING POSITION FOR LIGATURE OF THE INFERIOR MESENTERIC ARTERY, AND THE WAY IN WHICH A COLLATERAL CIRCULATION IS LEFT.

from the surrounding structures; the posterior part of the wound is deepened, after removing the coccyx, until communication is established with the upper wound. The whole bowel will now come down, and may be drawn out through the wound. This bowel will consist of the whole of the rectum and the lower part of the sigmoid flexure. It should be seized by the assistant, and a good light thrown on to the deep part of the wound. All bleeding is carefully stopped, and the bowel then placed back in position, but with the rectum and part of the colon, including the tumour, out-

side the anus, and the parts are drawn together with sutures around it, good drainage being left. A few stitches are inserted around the anus, taking up the muscular coat of the sigmoid to prevent retraction. After all the dressings have been applied the bowel is divided about an inch away from the anus, and a long rubber tube passed up the bowel, on to which the stump of the sigmoid is tied.

Another method of performing the second stage, also with the object of leaving a normal anus, is to divide the rectum 2 inches above the anus, and evert it through the anus by dragging on the upper cut edge with forceps. After the rectum and growth have been cut away, the stump of the sigmoid is drawn through the everted stump of the rectum, and the edges are sutured together with a continuous suture. Lastly, the prolapse thus formed is returned, so as to leave the bowel once more continuous. A tube is then inserted through the anus into the sigmoid.

These methods of performing the second stage of the operation seem worth doing in cases where the growth is not large, and where it is situated high up in the rectum and well away from the anus. It always seems a pity to remove a normal anus unless this is absolutely necessary, as perfect control cannot be obtained unless the normal structures are preserved. The risks of the operation are considerably reduced by establishing a temporary colostomy or cæcostomy. The chief danger of this operation is sloughing of the transposed colon.

The Degree of Disability.—This is very important, and difficult to gauge accurately. The resulting disability is almost entirely due to the colostomy opening. It is undoubtedly much less than in cases where a sacral anus has been left, as there is no trouble from prolapse of mucous membrane with a modern colostomy opening.

Out of seventeen hospital cases in whom it was possible to investigate the disability from a wage-earning point of view, it was found that twelve had returned to work within a year of operation, four had not, and one had been obliged to take a lighter job. Those returning to work included persons in the following occupations: engine-driver on the railway, actor, washerwoman, workshop foreman, drapery assistant, munition worker, physical drill instructor, and stevedore. The disability would appear to be surprisingly little.

The disabilities of the operation are thus those incidental to the presence of a colostomy in place of the natural anus. Most of the disability is vastly less than has been supposed. The great majority of patients who have had a colostomy for more than six months suffer no inconvenience at all from it. Their bowels act regularly each morning, and they are perfectly safe during the remainder of the twenty-four hours. They are able to travel, hunt, shoot, and play golf, just as other people do. I have a large number of patients who have had a colostomy for

many years, and it is only very rarely that I find one who is inconvenienced by the presence of the colostomy opening.

The blind portion of the bowel below the colostomy in perineal excision seldom gives any trouble. I have never known it to cause serious trouble, and the only cases where there has been any difficulty have been those where the colostomy did not function properly and the spur had gone back. If, owing to retraction of the spur, fæces are able to find their way into the blind end, the patient will experience discomfort. This will not happen, however, if there is an adequate spur. Sometimes, owing to the patient putting on weight after the operation and getting a fat abdomen, the spur tends to retract. If this occurs, it should be corrected. Should fæcal matter get into the distal portion of the colon it will cause a feeling of pressure and discomfort in the pelvis. This can be relieved immediately by washing out the blind end of the bowel through a tube in the colostomy opening. In most patients there is no discomfort from the lower portion of the colon, and we do not have to take any precautions with regard to it.

In the last few years it has been my practice to make a colostomy opening with a skin bridge between the two ends of the colon (see Fig. 211, p. 542), so as to make quite certain that no retraction of the spur can occur and allow bowel contents to reach the distal blind bowel. I believe this to be a good practice. After the lapse of many years a colostomy opening may cause trouble. The commonest condition is narrowing of the skin opening and the next commonest retraction of the spur. Fortunately either of these conditions can easily be rectified without there being any necessity to open the abdominal cavity.

It is, I think, surprising how very satisfactory a modern colostomy opening proves to be. Patients who have had a colostomy for some years express themselves as quite comfortable and satisfied with the opening. I asked one patient of mine who has had a colostomy for sixteen years when he last had an accident from his bowel acting unexpectedly, and he replied that he was not certain, but not during the last five and a half years. I have never had a case of prolapse of the colostomy since I used the high opening level with the umbilicus, though this was a common nuisance in the early days of colostomy.

Prognosis.—We have to consider the prognosis in a case of cancer of the rectum from two points of view. First, the immediate risks of operation; and second, the chances of the patient being cured of the disease, the survival value of the operation. As regards the operative mortality from operation, there can be no question that perineal excision has the lowest death-rate. In 340 cases taken from both private and hospital cases the mortality was only 8 per cent., and this included patients up to the age of seventy-eight and many bad operative risks. In 172 cases

from my private case books there were only seven deaths, or a mortality of 4 per cent. This is probably as low as the mortality would be for any other operation, such as hernia, for persons of the same age. Where an abdomino-perineal excision has to be performed the mortality rate is much higher, and varies from 15 to 30 per cent., according to the skill of the surgeon and the care with which he chooses his cases.

The chances of any private patient with cancer of the rectum treated by perineal excision under the best conditions are roughly a 96 per cent. chance of surviving operation and a 60 per cent. chance of being well five years later. I think, in view of these figures, even the most pessimistic must admit that cancer of the rectum is by no means an incurable disease. There are a large number of people living useful and active lives who have been cured of rectal cancer as the result of modern surgery. The proportion of cures would be much higher if all cases were submitted to operation in the early stages of the disease. The chief handicap to curing rectal cancer is *not bad treatment, but late diagnosis.*

Cases are not counted as cures until they have survived the operation five years. Out of a total of 340 cases operated upon by the perineal method, there are 230 in which operation was done five years or more ago. Of these, 111 patients survived the five-year period, 100 had recurrence, fifteen died of other causes and four were untraced. If those who died from other causes, and untraced cases are left out, the percentage of cures is 52 per cent. There were seventy-two patients who had survived operation seven years or more, forty-three who had survived ten years or more, and seventeen who had survived fifteen years or more.

In deciding which operation of those available is the best for any individual patient with cancer of the rectum, it is obvious that that particular operation which will cure the largest number of patients with the least risk must be the best. There does not seem to me to be any doubt that the perineal operation, with a preliminary colostomy, best fulfils these conditions when the growth is so situated that it can be used. Cancer is to start with a local disease, and if completely removed will not recur, and the only cures take place in those cases where it is removed completely during the early stage. We should, therefore, remove it as early as possible by the method which involves the least risk.

CHAPTER XX

RADIUM AND PALLIATIVE TREATMENT OF RECTAL CANCER

The treatment of rectal carcinoma by means of radium is at present still in the developmental stage, and there is much to be done before the results can be compared favourably with those already achieved in uterine and mouth carcinoma. Rectal carcinoma presents special difficulties, and is beset with problems of its own, largely owing to the difficulties of obtaining satisfactory access to all parts of the tumour.

Radium may be used in three ways in the treatment of rectal carcinoma:

1. As an alternative to excision.
2. As an adjunct to operative excision, thereby enabling a less serious operation to be performed, or to make the operation more complete.
3. To treat cases that are surgically inoperable.

In view of the results up to date I do not think any surgeon would advise the treatment of an operable case of cancer of the rectum by radium alone. A few cases have been treated because the patient has refused colostomy, or excision was otherwise not advisable on account of age or infirmity, but the results of radium treatment at the present time do not justify it being used in place of excision in operable cases.

It is even doubtful whether results will ever be good enough to justify it being used as a substitute for excision, except in those cases where the growth is low down and easily accessible. Its chief value lies in the treatment of cases where the growth is removable, but the patient is not in a condition to stand the necessary operation, either on account of age or complicating conditions. Radium is also probably the best method of treating cases of epithelioma of the anal region.

Apart from operations for the complete removal of the tumour and all the surrounding tissues which may contain cancer cells, we have no other means at present of curing patients with cancer of the rectum except by means of radium. There is no doubt that in radium we have a very valuable means of treating malignant growths if we can use it properly, but the technical difficulties are very great, and it will probably be some years before a really reliable method has been found. Progress in this direction has been very rapid lately, and the fact that in a few cases we can completely and permanently eradicate cancer of the rectum or anus without leaving any damaged tissues, and without the necessity of a

colostomy, proves that success is possible. If a cure can be obtained once, it is obvious that it can be obtained many times if we can get the technique of its application right, and this should encourage us to persist with this method of treatment. Radium treatment has the great merit over treatment by operation that it does not involve any mutilation, and leaves the patient in a successful case quite normal.

The best results in the treatment of cancer by means of radium have been obtained in cases of cancer of the cervix uteri, the buccal cavity, the skin, and the breast. The results in cases of cancer in other situations have been much less satisfactory. Although cases of cancer of the rectum have been treated with radium for the last fifteen years or more, the results have been until recently so unsatisfactory that many surgeons have ceased using it for cancer in this situation. Monod, of Paris, has reported very unfavourably on the treatment of rectal cancer by radium, and quotes forty-nine cases treated in the Lacassagne Clinic during ten years (1919-29) with no absolute cure, and most of the statistical tables published appear to bear out his view. Gordon-Watson published some encouraging results, but was not satisfied with the treatment as a substitute for operation. He was dissatisfied both with the severity of the reaction which resulted and with the ultimate results. It is instructive to inquire why the results of treatment by radium in cancer of the rectum are so unsatisfactory as compared with the results obtained in other situations. It was stated at one time that adeno-carcinoma did not respond to radium as satisfactorily as squamous cancer, and that this fact accounted for the poor results in cancer of the rectum. In support of this view it was pointed out that epithelioma of the anus, which is squamous-celled cancer, does well if treated by radium, and that whereas the results in cancer of the uterine cervix, which is also squamous-celled cancer, are good, cancer of the uterine body, which is adeno-carcinoma, responds badly to radium. More recent work, however, has demonstrated that this view is not correct. Recent reports show that cancer of the uterine body responds quite satisfactorily to radium treatment with improved technique in the application of the radium, and I have found the same to be true of cancer of the rectum.

The important factor is the means of access to the growth. Squamous tumours are naturally superficial tumours, they are easily seen, and there is no serious difficulty in accurately applying the radium, so as to give a uniform dose of rays, but this is far from being the case when we have to deal with internal tumours, which are only accessible to a very limited degree. The success of radium treatment does not, in my opinion, depend to any serious extent upon the morphological character of the tumour, but almost entirely upon applying the correct dose of radium uniformly to the whole of the cancer cells. It is obvious that this is much

more difficult when we have to deal with a tumour inside the alimentary canal, and possibly in close proximity to other important structures, such as the prostate and bladder.

Technical Methods.—Assuming the presence of a primary growth which is sufficiently accessible to enable it to be radiated, the question of whether the surgeon is successful in any individual case depends upon his being able to distribute the radium through and around the growth with sufficient accuracy to insure that all parts of the growth will be subjected to an equal intensity of radiation, and that he correctly assesses the dose of gamma rays that are applied.

We have no means at present of accurately calculating the dose of radium which it is necessary to apply. We are rather like the early photographers, who were obliged to guess at the exposure necessary to obtain a good photograph. We can at present only go by experience and guesswork, as we have no means of measuring the size or cubic capacity of a tumour in the rectum. The so-called milligram-hour formula is worse than useless, because the cubic capacity of the tumour is not taken into account, and without this being included the formula is an absurdity. For instance, if 3,000 mg. hours is, we will say, the right dose for a tumour $1\frac{1}{2}$ inches in diameter, then the same dose applied to a tumour $\frac{1}{2}$ inch across will be most excessive.

It has been found from experience that the approximate dose necessary is 1 mg. of radium acting for ten days per cubic centimetre of tumour. This is the dose recommended by Gordon-Watson. When using radon seeds, 1·5 to 1·8 millicuries of radium emanation is about equivalent to 1 mg. of radium. It must be borne in mind that while the radium will be acting with the same intensity during the whole period, the activity of the radon will be diminishing to a vanishing point in ten days. This dose has been found to give the best results, but there is no means of applying it practically, and we can at present only make a rough guess, which will result in some parts of the tumour being overdosed and some underdosed. As we have to avoid underdosing, we are obliged to err as far as possible on the side of overdosage. Whether it will ever be possible to arrive at a more satisfactory method it is not possible to say, but there is certainly none at present, and we are obliged to rely upon the surgeon's experience and to dispense with any exact method of measurement.

As I shall show, where easy access to the tumour is possible the results are good, but when the tumour is so high up that it can only be reached by a speculum the results are most unsatisfactory. I have in the last few years treated a considerable number of cases of cancer of the rectum by radium, and obtained very satisfactory results; but these results have all been in easily accessible tumours, and in cases where the tumour was in the early stage of being localized to the rectal wall. As only those cases

have been treated which, on account of age or for some other reason, were inoperable, the number of early cancers treated by radium have not been very many. In cases of rectal cancer which are inoperable because of the spread of the disease into other tissues radium cannot be expected to give good results, except very exceptionally.

The method which I have recently adopted has been as follows: We will assume that the tumour is roughly 5 cm. in diameter, and is just inside the rectum—that is to say, its lower edge comes down to the upper end of the anal canal, and that it is on the posterior wall. We shall also assume that because of age, or for some other satisfactory reason, complete removal by operation is contra-indicated or impossible, for radium treatment does not give such good or reliable results as operation in such cases.

A careful examination is first made to get a fairly accurate approximation of the size of the tumour, or rather its extent. A 5 cm. circle is now drawn on a piece of squared paper, marked out in centimetres, and at each junction of the lines a dot is made, and the dots are carried outside the circle for 1 cm. (as in Fig 160). Now by counting the dots we shall find how many 1½ mg. seeds of radon we require for our dose. In addition, we must allow for several more which will have to be placed in the deep parts to attack the lymphatics draining the cancerous area. This will probably be six to ten extra seeds, according to the conditions present.

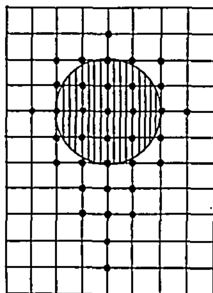


Fig 160.

If needles are used, the same method can be applied. The objection to using needles is that they are much more liable than seeds to cause serious sepsis. This is partly because of their greater size, and partly because of the necessity of having to remove them again.

I have obtained much better results by using radon seeds than radium needles. The seeds do not cause so much sepsis as the needles and can be much more accurately placed in position. Needles may be used in addition to seeds, or can be used for treating the lymphatic areas, but are very liable to set up sepsis, and seeds are safer. Each seed is calculated to be equal to 1·8 millicuries at the time of insertion, and is screened with from 0·5 to 0·8 platinum, or the equivalent in gold.

At the operation the growth is curetted away as far as possible with a

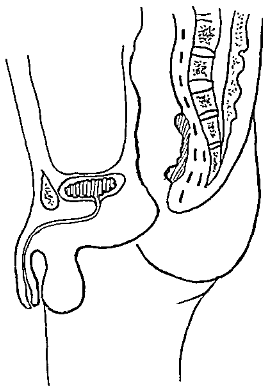


Fig. 161.—Diagram showing Radon Seeds behind a Cancer of the Posterior Wall and along the Line of the Lymphatic.

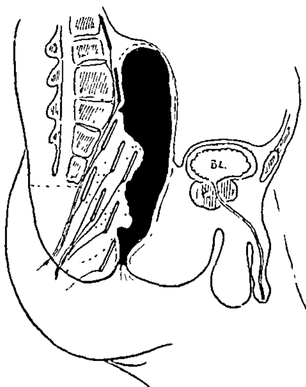


Fig. 162.—Posterior Barrage by Radium Needles of a Tumour in the Rectum.

sharp spoon, care being taken not to go through the wall of the rectum or damage other structures. The removal of the major part of the growth is a great advantage in accurately placing the radium, especially if the raised edges of the growth can be got rid of. Bleeding, as a rule, is not troublesome, and can be controlled by the cautery or by packing. The rectum is next washed out, and the skin outside rendered as aseptic as possible. The surgeon, with one finger in the rectum to guide him, inserts the seeds from punctures in the skin outside the anus by means of a special introducer, which is loaded and discharged by an assistant. The seeds are placed as accurately as possible in rows, so as to cover the whole area at centimetre distances from each other, and are placed, not in the growth itself, but into the area of tissue immediately beneath and around it. This is not at all an easy proceeding, and it is most important that no area should be missed. At the same time, too large a dose in one spot will result in a slough. The lymphatic areas are treated by depositing seeds in rows at 1 cm. distance along the lines of the lymphatics draining the area of the growth. After all the seeds have been inserted the rectum

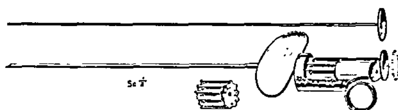


FIG 163 —SOUTTAR'S RADON SEED INTRODUCER.
Each barrel holds ten seeds.

is packed with vaseline gauze around a drainage-tube, a dressing placed in position outside, and the whole fixed with strapping. The packing and tube are removed in about two days.

As a rule the reaction is not at all severe, but the patient should be kept very quiet for a week to prevent the seeds from being disturbed. At the end of ten days they will have exhausted themselves, and are no longer active. If the dosage has been fairly correct there should be very little secondary reaction, and the patient can return home about ten days to a fortnight after treatment. The seeds usually cause no trouble, but occasionally some of them set up sepsis and are discharged.

In a case where treatment has been successful the results can be seen very quickly. I have on several occasions seen the cancerous ulcer entirely healed up in six weeks, and smooth mucous membrane replacing the previously hard malignant tissue of the growth. Examination with specula or a sigmoidoscope reveals no sign of the original ulcer. If there has been overdosage there will be considerably more reaction, and the ulcer will be largely replaced with dense fibrous tissue; but if a correct

dose has been given very little fibrous tissue results, and in some cases I have been unable to detect a year later where the original growth has been. It is only occasionally that the dosage can be gauged so accurately that total disappearance of the growth without scarring can be obtained, but the fact that it can sometimes be obtained is very encouraging, and proves that if we can improve the technique of radium treatment such results can be obtained with much greater frequency than is the case at present. What can be done once should be able to be done often.

It is not possible to evaluate the results of radium treatment in cancer of the rectum on a basis of freedom of recurrence over long periods of years at present, as sufficient figures are not available. The proportion of recurrences is certainly very high as compared with surgical removal of the rectum, and treatment by radium should only be carried out in those cases where operative removal is impossible, or unduly dangerous, on account of age or infirmity, and in a few cases where the patient refuses to have a colostomy opening and is prepared to take the risk of an early recurrence rather than undergo a radical operation.

In a number of cases there has been no recurrence of the original tumour after periods of three years and over, and this is sufficient to justify the method. There is, after all, no other form of treatment by which a cancerous growth in the rectum can be got rid of, for even a short period, apart from operative removal. While radium treatment in the manner here described cannot be considered free from risk, it is at least very much safer than radical operation, and can be carried out on quite old people and in very bad risks, with every probability of their surviving, provided the tumour is easily accessible and not very large. The treatment affords a fair chance of curing cases which otherwise must be abandoned as hopeless from a curative point of view. Even when the treatment fails to result in a cure it often prolongs life very considerably, and gives great comfort to the patient by diminishing the discharge, etc.

The following case illustrates the result that can sometimes be obtained by radium, though it is not often that we can expect an equal success:

Case.—The patient was an old gentleman, aged seventy-four. He had cardiac disease and a slight amount of albumen in his urine. He was a very bad operative risk, and would not have been able to survive removal of the rectum in the opinion of his doctor. He had an adeno-carcinoma about the size of a two-shilling piece on the posterior rectal wall quite low down. The lower edge of the tumour was situated at the upper level of the anal canal. The tumour was freely movable, and there was no evidence of enlarged glands or extra-rectal spread. A portion of the lower edge of the tumour was removed with Brüning's forceps and examined microscopically. The report of the pathologist was that the tumour was a typical adeno-carcinoma. Under avertin and spinal anæsthesia the tumour was curetted down to the fibrous

tissue and scraped away as far as possible. Radon seeds were inserted through punctures in the skin of the perineum, so as to lie underneath and around the tumour area. Seeds were also placed in the tissues behind and above the tumour, and laterally in the lines of the lymphatics. A large drainage-tube was placed in the rectum, and the lower part of the rectum packed round it with vaseline gauze.

The patient returned home in three weeks, and at that time there was a healing ulcer which was quite soft and did not in any way resemble a cancer. Three months later the mucous membrane in the situation of the tumour was quite normal and did not even show a scar, but at the extreme upper part of the area which the tumour had occupied there was a nodule the size of a pea. This was removed and found to be adeno-carcinoma. The patient had no symptoms at all and declared himself quite well. The patient has to be watched very carefully, but has so far, six months later, shown no signs of growth, and appears to have a normal rectum.

Cases where the Tumour is not easily Accessible.—The method already described is only suitable for tumours which are low down and within easy reach. For tumours in the middle of the rectum, or above this, a different technique must be adopted. The method advised by Gordon-Watson is as follows:

The tumour is exposed from behind by a vertical incision and removal of the coccyx. Needles, or seeds, are then inserted into and around the tumour, and along the lines of lymphatic spread, the rectum and growth being separated from the pelvic wall as far as possible to facilitate access to its posterior surface and the lateral walls. The threads, if needles are used, are tied together and the wound packed with flavine gauze and kept moist by the Carrel-Dakin method, the skin wound being temporarily closed until the removal of the radium. The radium is left in place for ten days. The wound is left open after removing the radium, and though healing is slow, should be healed in about six weeks. In women access through the posterior vaginal wall is often possible.

ABDOMINAL RADIATION

When a growth high up in the rectum h. s to be treated with radium it is nearly always necessary to perform a preliminary colostomy, as obstruction is liable to occur from the reaction of the tumour which takes place after the introduction of the radium. At the time when the colostomy is performed the upper aspect of the growth should be radiated and the lines of spread treated at the same time. When the growth is entirely above the peritoneal reflexion radiation will have to be performed from the abdomen, as access from the bowel will be difficult or impossible.

Abdominal radiation is best carried out by means of seeds. There are very considerable difficulties in using needles, as they have to be removed

subsequently, and also the local necrosis which occurs round the needles is very liable to set up peritonitis. It is never safe to leave either a needle or a seed near the surface of the peritoneum where the small intestine can come in contact with it, as serious damage to the bowel wall will *inevitably result*. Under such circumstances it is safer to pack vaseline gauze in over the radiated area so as to keep the small intestine well away from the radium. Radon seeds have a particular advantage in the abdominal cavity, since they can be left permanently in place.

If needles are employed, packing and drainage are essential. It is extremely *important to avoid puncturing the lumen of the bowel*, and the needles should be applied as far as possible parallel with the long axis of the bowel.

The patient should be in the Trendelenburg position in a very good light, and an adequate incision should be made in the abdominal wall. Great care and patience will be required to place the seeds accurately in position.

Sir Charles Gordon-Watson, who has done a considerable number of these cases, is of opinion that the best results are obtained by means of needles, but admits there is a good deal of danger in their use in the abdominal cavity, and that the greatest care should be exercised to prevent what might be a fatal peritonitis.

Where the growth is to be attacked both from the abdominal cavity and from below, this may all be done at the same time, or the barrage from below may be done when the upper needles are removed.

The results of radium treatment in the case of growths high up in the rectum and in cases where the growth is too advanced to be operable are not very good. The response is sometimes very rapid, at other times, for no reason that we know at present, it may be almost negligible. In a favourable case the growth begins to diminish in size in about eight to ten weeks, and will have entirely disappeared in about four months. If the dosage has been accurate, the tissues will be replaced with what appears to be more or less normal tissue. Very frequently, however, especially if there has been over-dosage, a dense mass of fibrous tissue will replace the growth, and it is very difficult to be certain whether it is growth or fibrous tissue. It too often happens that although the greater part of the growth is completely destroyed, islands of cancer cells escape the rays. This is very well seen in some of the specimens that have been removed after successful radiation. Re-radiation is seldom of very much good, as the tissues appear to become radio-resistant.

Epithelioma of the Anus.—In cases of squamous-celled cancer of the anal margin treatment with radium gives excellent results provided that the case is treated early before gross spread to surrounding tissue, and especially spread to the inguinal glands, has taken place. I have treated all the cases of the condition that I have seen within the last four years

with radium in preference to excision of the rectum, and am of opinion that the results are at least as good as by excision, and there is the great advantage that the patient is left in a normal state and no colostomy is required. Of course, the gland areas have to be treated, and may have to be excised if the growth is large. Radium treatment of the gland areas is not so satisfactory as in the case of the primary tumour. Epitheliomata are naturally very accessible, and the radium (best used in the form of radon seeds) can be very accurately applied to the tumour. It is very interesting to see the change which occurs as the result of the rays. In about a week, in the case of a small tumour, the epitheliomatous ulcer changes in character, and looks much more like a healing burn than a cancer, and at the end of about three weeks a small epitheliomatous ulcer



FIG. 164.—EPITHELIOMA OF THE SKIN OF THE PERINEUM BEFORE TREATMENT WITH RADIUM (SEEDS)



FIG. 165.—THE SAME THREE WEEKS AFTER TREATMENT.

The fold of skin was quite soft, and there was no ulceration or other sign of tumour.

will have healed over. In a month or five weeks it will have disappeared, always assuming that the dose was approximately correctly judged. There are few cases more spectacular than those where malignant epitheliomatous ulcers involving the anus heal up and leave healthy soft tissue with hardly a scar to mark the place as the result of radium; and although such results cannot always be obtained, the fact that they can sometimes be obtained is proof that with improved technique and increased experience a much greater measure of success is obtainable.

Needless to say such patients require to be watched very carefully for a period of four or five years after treatment for signs of any recurrence either locally or in the inguinal glands, and if there is any sign of involvement of the glands these must be dissected out or treated by radium and X rays. If there are signs of recurrence of the tumour the lesion should

be treated again with radium, or cut out; but it is not advisable to insert radium into the same area at shorter intervals than six months, as very violent reaction may result, with sloughing of the tissues. It is generally stated that recurrences do not react so satisfactorily to radium as the primary tumour, but this has not been my experience, except where dense scarring has resulted from the original application.

CASES OF ADENO-CARCINOMATA OF THE RECTUM TREATED WITH RADIUM.

Case.	*Age.*	*Date when Radium was Inserted.*	*Subsequent History.*	*When Alive.*
1	52	February, 1929.	Tumour disappeared, but recurred in six months. Treatment repeated. Recurred again April, 1931. Treatment again repeated.	Died of recurrence June, 1932.
2	55	March, 1929.	Growth entirely disappeared and patient quite well for three and a half years. In November, 1932, developed another primary growth just within the anus. No recurrence at old site. Treated with radon January, 1933, and April, 1933.	Well July, 1933. Tumour disappeared.
3	82	October, 1929.	Growth completely disappeared.	Died of pneumonia during 1932. No recurrence.
4	65	April, 1930.	A year later there was a hard ulcer and many polypoid masses. Sinus still discharging.	Died April, 1934.
5	50	October, 1929.	Growth entirely disappeared.	Well July, 1933 No symptoms.
6	78	January, 1931	Distinct improvement. Growth smaller and more mobile. Treatment repeated nine months later, and in June, 1932	Alive December, 1933, but has signs of stricture and obstruction.
7	61	May, 1931.	Growth entirely disappeared.	Well April, 1934.
8	58	October, 1931	Growth entirely disappeared after two months.	Well March, 1933
9	71	November, 1931.	Two months later fibrous swelling where the tumour was No ulcerative surface.	
10	77	March, 1932.	Six months later the tumour was much smaller and the patient in excellent health. Treatment repeated March, 1933	Well June, 1933.
11	68	March, 1929	Great improvement.	Well June, 1933.
12	35	November, 1932 (Patient refused radical removal)	Great improvement. Treatment repeated February, 1933. In May, 1933, the patient got signs of obstruction and colostomy was performed Growth found to be very small and still mobile. Perineal excision performed and rectum removed successfully.	Died of nephritis August, 1933.

CASES OF EPITHELIOMA OF THE ANUS TREATED WITH RADIUM.

Case.	*Age.*	*Date when Radium was Inserted.*	*Subsequent History.*	*When Alive.*
1	79	May, 1929.	Three months later the growth had almost disappeared. Treatment repeated.	Untraced since. Went to Australia.
2	57	May, 1930 (advanced case).	A year later the growth had disappeared	Well to date.
3	75	August, 1931.	After four months the growth had completely disappeared. Slight recurrence in October, 1932. Treatment repeated and again April, 1933.	Well to date.
4	59	April, 1932	Growth entirely disappeared in a few weeks Nine months later nothing to be seen.	Well to date.
5	72	January, 1933.	Growth entirely disappeared in one month	Well to date.

N B —These were all cases in which the tumour was not very advanced and were operable, but for some reason could not be operated upon. No advanced inoperable cases treated by radium are included.

An undoubted risk, however, is the possibility of late reaction. This may occur at any time from six months to over a year after the application of radium. The tissues which had healed and become apparently healthy have suddenly sloughed, with the formation of areas of callous tissue which refuse to heal. The exact cause of this curious condition is not known, but it appears to be an indirect result of the radium. It is not very common, and I have only met with two instances, though a number of others have been described. It seems to be most liable to take place when repeated doses of radium have been used in the same area.

In the report of cases of epithelioma treated at St. Mark's by radium and published by Gabriel there were eight early cases, in four of which the results were reported as good, the tumour having disappeared and no recurrence been noted for periods from two to three years. The other four cases all had recurrence.

The whole subject of the radium treatment of rectal cancer is at the present time in what may be described as a stage of transition. Two or three years ago the results were so bad that many surgeons abandoned the use of radium in these cases, but since then better results have been obtained and a much more optimistic view is now being taken. Some surgeons use radium combined with operation, while some use it without. There are many different methods in use, and it is not possible to compare results or to evaluate radium treatment in terms of statistics at present.

My own belief is that it is of little use in inoperable cases, but that it is establishing itself as a substitute for operation in early cases where the tumour is easily getatable, and I should not be surprised if it eventually ousted operation in such cases altogether. I consider that in cases of epithelioma of the anal region the results of radium treatment are better than those obtained by operation.

Palliative Treatment of Malignant Disease.

Unfortunately quite half the patients who consult a surgeon on account of cancer in the rectum are inoperable when first seen, the growth being already too advanced for there to be any hope of curing the patient either by removing the rectum or by treating the growth with radium. In a certain proportion of cases also operation is impossible on account of the age of the patient or his general unfitness to stand an operation. It is a mistake to think that because no radical treatment capable of curing the patient is possible nothing can be done, and, indeed, it is most cruel to let these patients think that their case has been given up, and there is nothing left for them to do but to die. On the contrary, a great deal can be done, though we cannot, of course, promise any permanent result.

It is very usual for the patient or his friends to ask how long he has to live when a growth has been discovered in the rectum which cannot be removed. Personally I always refuse to answer such questions, as any answer is little better than guesswork. The time before the disease proves fatal varies so enormously in different cases, and as the result of different conditions both of mind and body, that it is quite futile even to hazard a guess as to the length of time any particular individual has to live.

I have had patients who have lived in comparative comfort for as much as five and even six years after an inoperable growth was discovered—in fact, in sufficiently good health to be able to get about and continue their business; while two years is not at all an unusual time for a patient to live, even though the growth cannot be removed.

Palliative Colostomy.—There is a good deal of difference of opinion among surgeons as to whether colostomy should be performed in inoperable cases. Some surgeons maintain that colostomy simply adds to the patient's discomfort without giving him any real advantages, while others believe that it gives the greatest possible relief in such cases. As the result of considerable experience I am personally convinced that colostomy considerably prolongs the patient's life, especially if it is performed before the patient has become seriously run down in health. At the very worst, colostomy will prolong the patient's life at least six months, and it undoubtedly alleviates many of the worst discomforts. If a colostomy is performed early, while the patient is still in fair health, and if the lower bowel is afterwards kept washed out regularly with antiseptics, it is possible to prevent secondary septic infection to a very large extent, and many of the secondary inflammatory complications which arise in the neighbourhood of the growth will be avoided.

Many of the deaths which occur at an early stage in cancer of the rectum are due rather to secondary inflammatory processes than to direct invasion by the growth. All the cases I have met with in which a patient with an

inoperable growth has lived for several years have been cases in which colostomy has been performed at an early stage. There is no doubt that the pain is considerably diminished where colostomy is performed, and also that the discharge from the rectum, which becomes such a distressing complication, is much less in those cases which have a colostomy. I am strongly of opinion that colostomy is a valuable means of treatment in incurable cases of cancer, but I maintain that we should perform it at an early stage, and not wait till symptoms of obstruction have occurred.

It is not generally realized how long a patient with inoperable malignant disease of the rectum may live if a colostomy is performed at the right time. In the great majority of cases cancer of the rectum remains a local disease for quite a long time, and if serious septic complications are prevented, as they can be when a colostomy has been done, the patient frequently lives for some years in considerable comfort. A few years ago I went shooting pheasants in the snow with a patient on whom I had performed colostomy two years previously for inoperable malignant disease I have known several cases where patients have lived as much as five or even six years after colostomy had been performed for an inoperable growth.

It is not sufficient, however, merely to perform a colostomy, and then abandon the patient to his fate. The patient should first be taught how to manage the colostomy opening, and how to wash out the lowe bowel with suitable antiseptics. His general nutrition should be improved as much as possible, as there can be no doubt that the growth develops much more slowly in a well-nourished and active person than in one who is in a poor state of health.

The Use of Colloidal Metals.—There have been various attempts to cure cancer with metallic substances in a colloidal state injected either into the veins or into the muscles. The best known of these substances are lead, selenium, and copper. The lead treatment was first introduced by Blair Bell, of Liverpool, and several successful cases in which the growth had disappeared or diminished in size were reported. Unfortunately the treatment is decidedly dangerous, and the number of successes very few. Better results appear to have been obtained by injections of a combination of selenium and lead. Colloidal copper has been used for many years, and I have treated a considerable number of cases with it. In two cases which have come under my observation the growth entirely disappeared after a prolonged course of treatment (eight or nine months). But such results are very uncommon and cannot be expected. On the other hand, I am sure that treatment with colloidal copper prolongs the patient's life quite materially and diminishes the discharge. It has the great merit of producing no dangerous symptoms, and the patient has the advantage of knowing that something is being done which might result

in a cure. This is an indirect but most valuable factor in the conduct of the case. The colloidal copper is put up in liquid form in sterilized ampoules of 5 c.c. It should be injected deep into the glutei muscles once or twice a week in doses of 3 or 5 c.c. Alternatively it can be injected into a vein. *The result of an injection is to cause some reaction in the tumour*, as shown by an increased discharge for one or two days, slight pain, and evident swelling. The injections should be given once a week for four months, then stopped for a month and resumed for another four months, and so on, *if the treatment is doing good. If there is obvious improvement, the dose* may be safely doubled for a time. Severe reaction is very uncommon, and I have only known it to occur on two occasions, neither of which was serious.

The patient, however, must be watched, as considerable reaction may occur. Most of the reaction takes place in the growth, which becomes more painful; bleeding is increased and the discharge increased, followed in a few days by a marked diminution of all the symptoms. Intolerance to the drug is sometimes seen in the shape of myalgic pains and hæmaturia.

Cancer Serums.—From time to time a new serum is advocated which is supposed to have the effect of causing regression of cancerous tumours, but so far no such serum has been found which has any real effect upon tumours.

CHAPTER XXI

INJURIES AND FOREIGN BODIES

Injuries to the Rectum.

INJURIES to the anus and rectum from external violence are uncommon as compared with other parts of the body. The rectum may be injured from sitting upon sharp objects or falling upon blunt ones. Bullet and shell wounds in the rectum were not uncommon during the war. In women the rectum is sometimes injured by the pressure of the fœtal head during the second stage of labour if the latter is unduly prolonged. Cases are on record where a large part of the rectum, generally the anterior wall, has sloughed away from this cause, and I have on several occasions seen serious fibrous strictures of the rectum which have resulted from injuries during labour. Needless to say, such injuries could hardly occur unless labour has been very badly managed.

Kelly of America pointed out how frequently the rectum is damaged by careless examination for gynæcological conditions, and he reported four cases in which the peritoneal cavity was perforated by the examining finger. Such accidents, one imagines, cannot be common. Many injuries of the rectum and anus result from unskilled operations. These most generally take the form of damage to the sphincter muscle, causing incontinence of a more or less permanent character. The rectum may be seriously injured, and even the peritoneal cavity perforated, without any external evidence of trauma, or any injury to the anus and sphincter, the foreign body passing through the anus and then perforating the wall of the rectum. One of the Kings of England is supposed to have been murdered in this manner by means of a red-hot iron passed through a hollow horn.

I once saw a case where the patient, a young man, fell off a step-ladder on to an umbrella stand, and the handle of an umbrella passed through his anus, without apparently injuring it, and then through the anterior wall of the rectum, perforating the abdominal cavity. He was brought into hospital much collapsed, but was successfully operated upon and his life saved.

In a similar case the handle of an umbrella broke off in the rectum, and was removed by operation from the transverse colon several months later.

In the early days of the sigmoidoscope there were several cases in which the peritoneal cavity was perforated by doctors using the instrument

carelessly. In one case the doctor passed the instrument, and on withdrawing the obturator and inserting the light and looking through the tube found he was gazing at the gall-bladder. These accidents should not occur, and although probably the sigmoidoscope has been more frequently used at St. Mark's Hospital than anywhere else, we have no record of any injury having been caused by it.

Rupture of the rectum from indirect violence must be exceedingly rare. A case, however, that would appear to come under this heading was recorded by Franklin. The patient was a boy, aged seventeen, who had been crushed between a "rule beam and the mule" at a cotton-mill. The patient died two hours after admission to hospital, and at the post-mortem examination it was found that there was a vertical tear on the anterior surface of the rectum ¾ inch long and 3½ inches from the anus. There was no stricture in the pelvis nor any sign of external injury.

Patients occasionally injure themselves with dilators which they have been in the habit of using for keeping a rectal stricture dilated. The two following cases have occurred within my own experience:

The first case was a hospital patient, a man aged forty-seven, who had been in the habit of dilating his rectum with a gum-elastic bougie for some three years. He was brought up to the hospital one day in a state of collapse, and it was found that he had pushed the bougie through the anterior wall of the rectum and opened up the peritoneal cavity.

The second patient was a lady, who for some three years had been accustomed to dilate her rectum once a week with a bougie. On this occasion, having forgotten to pass the dilator for three weeks, she found considerable difficulty in passing it, so she sat upon it on the bathroom floor. Considerable pain resulted immediately, and within a few hours she became exceedingly ill. I was called in to see her about forty-eight hours afterwards, and found her with all the symptoms of peritonitis, and an immediate operation was performed; but the whole of the peritoneal cavity was found to be seriously infected, and in spite of all we could do she died about forty-six hours later.

A curious form of injury to the rectum is sometimes caused by compressed air. In certain trades air compressed to a very high pressure is used, and the air is conveyed by pipes with a nozzle at the end for connecting up to the various automatic tools. As a coarse form of joke the workmen using this compressed air have sometimes presented the nozzle of the apparatus at another workman's anus and turned on the tap, with the result that in several instances the rectum has been so suddenly distended that it has ruptured. At one time there were several deaths in a single year due to this cause. Apparently this has been put a stop to by the fact that one or two workmen were tried for manslaughter.

A few years ago I was sent for to see a gentleman who, while out shooting,

sat down rather suddenly on a wooden shooting-stick. The shaft of the stick split, and he impaled himself upon the lower end, some 6 inches of the stick passing through the anus. The external parts were not damaged, but the bladder was injured. After free drainage had been established he made a good recovery. I know of two other similar accidents, both of which proved fatal.

A case is recorded by Mursell of a Kafir boy, aged thirty, who injured himself by sitting upon a spike. He was admitted to hospital some two months later, and on examination it was found that a wooden spike had passed through the anus without injuring it, and transfixed the bladder. There was a large recto-vesical fistula, and urine was being passed per rectum. The patient was operated on, and apparently made a good recovery.

Injuries to the rectum or pelvic colon, which occur in war, whether from bullet or shell wounds, must of necessity be very serious; and as a fact the statistics show that injuries of this nature are attended by a higher mortality than injuries to other parts of the alimentary canal. Many of these cases must be fatal owing to concomitant injuries of the large vessels in the pelvis, or to resulting peritonitis.

Wounds involving the large bowel are generally complicated by other injuries, such as fracture of the pelvis, injury to the bladder, or damage to the large nerve trunks. One or more of the nerve trunks may be cut, but more commonly they are only concussed.

The worst cases are those in which a shell wound is complicated by a fæcal fistula and fracture of the pelvis. The following case is one of the most serious that I have met with yet:

Case.—The officer was wounded at the battle of the Aisne by a shrapnel shell; there was very severe hæmorrhage on the battlefield, and three days after he was injured a fæcal fistula developed. On admission to the hospital there was a large lacerated wound on the left side above the hip-joint. This led down to a hole about the size of a two-shilling piece (diameter about 2·8 cm.) through the wing of the left ilium, and all fæces were being discharged through this opening. The patient was profoundly septic, and a secondary hæmorrhage occurred soon after his admission. As it was impossible to deal with the wound while it was complicated by a fæcal fistula, I decided to open the abdomen, and either to perform a temporary colostomy or, if possible, to close the wound in the bowel. On opening the abdomen I found that the sigmoid flexure had been injured on its mesenteric border, and that it was adherent to the inside of the ilium. I succeeded in separating it, and after trimming up the edges I closed the wound in the bowel with sutures. The abdomen was closed and the wound drained through the hole in the ilium, another opening being made above the ilium in the loin, through which drainage-tubes were introduced into a large lacerated wound in the posterior abdominal muscles, where fragments of the shell

had buried themselves. After this it was possible to deal properly with the wound. There was no further trouble from the fæcal fistula, the bowels acting in the normal manner. The wound was exceedingly septic, as we had to deal with a compound septic fracture of the ilium complicated by *B. coli* infection. A rather alarming secondary hæmorrhage from one of the lumbar arteries was, however, the only complication which occurred, and the patient, I am glad to say, made an excellent recovery.

In this case I was able to close the wound in the sigmoid successfully, and so to save the patient the discomfort of colostomy. But this must often be impossible, and I believe that in most cases the best way to deal with severe wounds complicated by a fæcal fistula is to perform a temporary transverse colostomy, at the same time thoroughly opening up the wound and providing free drainage. After the wound in the bowel has healed, the colostomy can always be got rid of by a secondary operation. It is obviously impossible to deal satisfactorily with a serious wound of the pelvis if it is complicated by a fæcal fistula, and I feel sure that the best treatment in such cases is a temporary colostomy. This must, of course, be done in such a way as to leave a good spur, so that there is no possibility of fæces passing on into the distal bowel. The performance of a colostomy will, I think, be the best routine treatment in all cases in which there is a large or serious wound complicated by a fæcal fistula into the rectum or pelvic colon.

In the case of a wound which is quite small and is not complicated by fractured bone, but is complicated by fæcal leakage, an attempt may, I think, be justifiably made to get it to heal without resorting to a colostomy, provided that the patient has not developed a serious degree of sepsis. If such an attempt is to be made, the rectum should be drained by means of a tube introduced through the anus. Unfortunately, however, few patients can tolerate the presence of a tube through the anus for long, unless the sphincters have been divided. In the case of large lacerated wounds of the bowel, temporary colostomy is indicated as soon as possible. The closing of the colostomy is not a very easy matter, but, after all, this can be postponed until the patient is in the best possible circumstances as regards hospital accommodation and skill.

Injuries of the rectum are sometimes caused by carelessly administered enemata quite apart from the giving of caustic or boiling fluids. This accident generally results from the use of hard bone or vulcanite enema nozzles, and is unlikely to occur when soft rubber tubes are used. The injury results from forcing the tip of the enema nozzle through the mucous membrane of the rectum. The amount of force required is not very considerable, and the mucous membrane 1½ inches inside the anus is not very sensitive, so that the patient does not cry out. The enema,

instead of being injected into the rectum, is forced into the loose cellular tissue under the mucous membrane. If a Higginson's syringe is used, very serious damage, due to stripping the mucous membrane, may result. In the case of a douche enema the fluid probably will not run in at all, and the damage is confined to a small area round the original puncture. Very serious results may follow such an injury. There may be extensive sloughing of the mucous membrane, followed later by a degree of stricture which necessitates a colostomy. In some cases dangerous perirectal cellulitis has been set up.

Rayner reported three cases of this injury which had occurred in his own practice and four other cases which he had heard of. I have seen one case where a nurse passed a rubber rectal tube through the wall of the colon and injected part of an enema into the peritoneal cavity. The patient's life was saved by a prompt laparotomy with suture of the colon and colostomy.

Symptoms.—The rectum is generally torn on the anterior wall, partly because this comes opposite the anus, and from the fact that this is the line of least resistance. It results from this that in most cases, when the rectum is torn, the peritoneal cavity is perforated.

As a rule the condition will be easily recognized by the appearances of the parts, or by a rectal examination, aided by a history of the accident. Bleeding from the rectum and pain accompanied by shock will be the chief symptoms. Perforation of the peritoneal cavity should always be suspected, and the abdomen carefully examined for shifting dulness in the flanks, or other evidence of peritoneal injury. In males the possibility of an injury to the bladder should be borne in mind, and if there is doubt a catheter passed.

Treatment.—If possible, the patient should be given a spinal anæsthetic, and a thorough examination of the rectum made. The rectum should then be thoroughly disinfected by douching with warm lysol, or monsol, 1 drachm to the pint, and the bleeding-points controlled by ligatures. It is most important to provide thorough drainage. This is best done by passing fair-sized drainage-tubes of appropriate lengths to the bottoms of any tears in the rectal wall. The ends of these drainage-tubes may either be brought out of the rectum, or attached to long silk threads which are left hanging out of the anus. As a rule, it is a mistake to pack the wounds with gauze, as it tends to prevent them from healing, and also to bottle up the discharges and encourage sepsis. Providing sloughing and sepsis can be avoided, the wounds in the rectum generally heal pretty rapidly.

When it is certain that the peritoneal cavity has been opened, or when this possibility is suspected, immediate laparotomy is the correct treatment. If the patient has to be moved any distance before the operation can be

performed, a good dose of morphia should first of all be given to stop peristalsis. If the abdomen is freely opened up in a good light in the Trendelenburg position the tear can be located, and it should be carefully stitched up with catgut stitches. A tube should be inserted into the rectum to prevent pressure from flatus, and as a rule it will be advisable to leave a drainage-tube in the abdominal cavity. In some cases it will be advisable to do a temporary colostomy or cæcostomy, and this will generally be the safest if the tear is a complicated one.

Stercoliths and Foreign Bodies.

Occasionally a fæcal mass or enterolith forms in the bowel and causes a condition of chronic or, in a few cases, even acute obstruction. The commonest situation for such fæcal masses is the rectal ampulla, but they may also be met with in the cæcum, the sigmoid flexure, and at the splenic angle.

Out of the forty-six cases collected by Gant, the situation of the calculus mass was as follows:

	Cases.
Rectum	35
Sigmoid	5
Descending colon	1
Transverse colon	2
Cæcum	3

They are not infrequently met with in the rectum of old women the subjects of chronic constipation. Under such circumstances they are about the size of an orange and of the consistency of concrete.

Fæcal calculi are most frequently met with in elderly persons, but are not confined to any particular age, and may be found even in children. The concretion is usually single, but cases of multiple calculi have been recorded; in one case as many as thirty-eight were removed from the same patient.

The composition varies considerably. They may consist of any indigestible material which has been swallowed, such as hair, cotton fibre, and cellulose. The majority, however, are composed of a mixture of inspissated fæces and inorganic salts. The nucleus is generally a foreign body, such as a fruit-stone.

The chemical composition of these stercoliths, apart from the foreign bodies of which they may be composed, is variable; but the usual ingredients include magnesium and ammonium phosphate, potassium sulphate, sodium carbonate, calcium phosphate, and cholesterin. The centre is usually very hard, and white or colourless. Outside this are concentric layers of earthy matter of varying degrees of hardness.

These calculi are often of considerable size. I have removed one from the rectum which was the size of a child's head.

The diagnosis is often missed if a careful rectal examination is
The characteristic symptom is the involuntary passage of liq
Not long ago I was asked to see a patient who had just recove
severe attack of pneumonia, and had passed all his stools in
since. He had been treated for weeks with bismuth and opiu
examination of the bowel had been made. On passing my fing
rectum I found a large fæcal stone as big as an orange, and ul
the rectal wall. It was removed with difficulty, and the patient
control over his rectum at once.

The most distinctive cases of fæcal impaction, in which the
weighs several pounds, are those curious instances of congenita
and hypertrophy of the colon (Chapter XXIII., p. 397)

Fæcal calculi tend to set up inflammation in the wall of the
many of the symptoms they cause are due to this fact. Ulcer
in a few instances perforation, may occur.

The following rare case, in which a fæcal calculus was fo
splenic flexure, producing obstruction, was recorded by Mores

Case.—The patient was a woman, aged thirty-one, who h
from constipation for two years. Abdominal pains set
gestation, and a month after delivery a tumour was felt in the
The patient became ill, with symptoms of chronic obstruct
were only temporarily relieved by enemata. On opening th
a fæcal calculus of extreme hardness was found in the splen
the colon. This portion of the bowel was resected, togethe
calculus, and the colon anastomosed end to end. The patient
The stone required a hammer to break it, and consisted of
laminæ. It measured 7 inches in its longest by 5¾ inches in i
diameter, and weighed 368 grammes (about ¾ pound). Th
stricture from old ulceration at the site where the conc
impacted.

Case.—A case was recorded by Pozzi at the French C
Surgery in October, 1908, of a man who for years had suf
an abdominal tumour of absolutely wooden consistency. I
from the umbilicus to the pelvis, and was movable only in a
direction. No exact diagnosis had been made. Pozzi
laparotomy, and found that the tumour consisted of the lov
the sigmoid flexure, in which was a stercolith of stony hard
intestine was divided and the mass removed. The gut v
quently closed, and the patient made a good recovery.

On one occasion I removed a hair ball about the size of a gol
the middle of the pelvic colon. Previous to operation the t
thought to be a carcinoma.

Symptoms.—The characteristic symptoms of fæcal calculi ar
and colic. This not infrequently leads to a wrong diagnosis

times supposed that constipation should result from a fæcal impaction in the colon. The diarrhœa is spurious, and is due to the irritation and ulceration set up by the calculus. If the concretion is in the rectum, tenesmus is a prominent feature. After a time blood and pus may make their appearance in the stools. The stools themselves are thin, watery, and frequent, but small in quantity. The symptoms, in fact, are those of ulcerative colitis rather than anything else.

In fæcal impaction not due to a calculus ulceration is less common, and constipation is the rule, accompanied by abdominal colic and sometimes vomiting.

A careful examination both of the rectum and abdomen will generally clear up the diagnosis, as the mass can be felt. If it can be indented the diagnosis is clear, but where a hard calculus is present in some part of the colon where it cannot be seen by the sigmoidoscope, it may be difficult to distinguish the condition from cancer.

Treatment.—When the condition can be diagnosed, attempts should be made to soften the mass by means of large oil enemata, and if this succeeds the mass can be slowly washed out by repeated soap-and-water enemata. A solution of hydrogen peroxide, if it can be brought into contact with a fæcal concretion, will readily split it up and disintegrate it. As the peroxide soaks into the mass, bubbles of gas form in its substance and break it up. While this is a very effective method, it is not free from risk, as the large quantity of gas formed distends the bowel and may rupture it, especially if there is any ulceration. If a free exit for the gas can be insured, however, this method of breaking up the calculus may be tried.

As a rule, when the calculus is in the colon, surgical operation affords the only possible means of dealing with it. The abdomen should be opened and the portion of the colon containing the calculus brought into the wound. If possible, the calculus should be pressed up into a healthy portion of colon. This should then be incised in the long axis, and the calculus removed. Before closing the incision into the bowel the interior should be examined for a stricture, which is frequently present, and if this is found it should be dealt with at the same time.

It is as a rule useless to administer drastic purgatives to these patients until the mass has been broken up or softened. If the mass is in the rectum, it should be broken up with the fingers aided by a teaspoon, and then thoroughly washed away with repeated soap-and-water enemata, and after this a good dose of castor oil may be given to clear out the bowel.

In a few cases I have been obliged to use a hammer and chisel in order to break up the mass in the rectum before it could be removed.

With the patient under an anæsthetic the stone can always be got out with patience, if it is in the rectum, without damage to the sphincter.

It is well to remember that fæcal impaction, or the formation of a calculus, does not occur in a normal colon, and that the presence of one of these conditions indicates some abnormality of the bowel. The following case well exemplifies this statement:

Case.—The patient was an elderly gentleman who for some months had been troubled with constipation, to which he was not accustomed. On examination of the abdomen, his doctor discovered a tumour in the left iliac fossa, and asked me to see the patient with a view to ascertaining its nature. Before I saw him a dose of castor oil and several enemata had been administered, and as a result the tumour had disappeared. An attempt to examine him with the sigmoidoscope failed, as the bowel was still loaded with fæces. We came to the conclusion that the tumour had been a fæcal mass, but that a further examination after the bowel had been emptied was advisable to ascertain the cause of the accumulation. To this, however, he would not agree, as he considered himself cured. A year later this patient had an attack of acute obstruction, and colostomy was performed. It was then discovered that there was a cancer of the sigmoid flexure, which had doubtless been present before, and could have been detected had he submitted to be examined properly.

Foreign Bodies.

The foreign bodies which have at different times been found in the rectum are both numerous and varied. The reason for their introduction is in many cases obscure, but in others there has been some definite object in view, perhaps the most common being the relief of pruritus. It is a well-known fact that in some cases immediate relief from itching follows the introduction of a bougie or a finger into the rectum, and doubtless this accounts for the introduction of the foreign bodies in some cases. In some instances it has been the act of a lunatic, or has been done through sexual perversion. One of the most curious cases is that related by Hevin. Some students introduced the frozen tail of a pig into the anus of a French prostitute. The bristles were cut short, and having prepared the passage with oil, they introduced the tail with great force into the rectum, allowing a portion to protrude. Great pain and violent symptoms followed. Efforts to remove the tail proved unsuccessful; the arrangement of the bristles which allowed entrance prevented removal. On the sixth day, in great agony, the woman applied to Marchettis, who succeeded in removing it by passing a hollow reed into the rectum outside the bristles, and then removing both reed and tail together. The patient recovered.

Morand, in his memoirs of the Academy of Surgery in Paris, speaks of a monk who, to cure a violent colic, introduced into his fundament a bottle of "l'eau de la reine de Hongrie," with a small opening in its mouth, by which the contents, drop by drop, could enter the intestine. The bottle could not subsequently be removed, and caused great distress. It

was at last necessary to secure a boy with a small hand to extract the bottle.

Studsgaard mentions that in the pathological collection at Copenhagen there is a smooth stone, 17 cm. long, weighing 900 grammes, which a peasant had introduced into his rectum to relieve prolapse.

In Nelson's " Northern Lancet " (1852) there is the record of the case of a man at stool who slipped on a cow's horn, which entered the rectum and lodged beyond the sphincter. It was removed with great difficulty.

A convict at Brest put up his rectum a box of tools. Serious symptoms occurred, and he died seven days later. After death the box was discovered in the transverse colon. It was a cylindrical box of sheet-iron covered with skin. It was 6 inches long and 5 inches broad, and weighed 22 ounces. It contained a piece of gun-barrel, a screwdriver, a saw for cutting wood and another for metal, a boring tool, a file, a half-franc piece and four one-franc pieces, some thread, and a piece of tallow. It was found that these tool-boxes were in common use among the convicts, and were always concealed in the rectum, but the patient in this case had in his excitement put it in wrong end forward, with the result that it could not be expelled.

Many instances are recorded of thieves having placed articles in the rectum which they wished to temporarily hide. Coins, keys, jewels, diamonds have all been found, owing to the thief being unable to retrieve them from the bowel.

Hockenhull extracted 402 stones from the rectum of a boy of seven. Landerer speaks of a curious case in which the absorptive power of the rectum was utilized in the murder of a boy of fifteen. In order to come into the possession of a large inheritance a woman poisoned the boy by placing the ends of phosphorus matches in his rectum, with the result that death followed in a few hours. The woman was caught and committed suicide.

The following case is chiefly remarkable for the ingenious method adopted for the removal of the foreign body:

A marine engineer, after an exploit on the " Barbary Coast " in San Francisco, was the victim of rowdy companions. Next day, while searching within the rectum to determine the cause of certain unusual symptoms, he located something that felt like the edge of a glass. Manual manipulations failed to dislodge the intruder, so he tried thumb forceps, with the result that a particle of the edge of the glass was snipped off with each grasp of the instrument, leaving a serrated edge. The method of removal was as follows:

Pieces of gauze bandage were dipped in plaster-of-Paris paste, and inserted into the hollow of the glass through a speculum with long dressing forceps until the glass was packed overfull. The last strip was sufficiently long to leave more than 12 inches free for traction. Within half an hour

the plaster was solid. As traction was made, small particles of loose, hardened plaster preceded the glass, and fragments and splinters were incorporated with them. No difficulty was experienced in bringing the glass to the sphincter. This was dilated with the vaginal speculum, and the foreign body was withdrawn with but little resistance and no bleeding.

The object proved to be a common 5-ounce "high ball" glass. The victim returned to duty next day. There was no after-pain or complication.

At a meeting of the Subsection of Proctology at the Royal Society of Medicine, Ivor Back showed a patient from whom he had removed an inkpot, the base of which was 3½ inches in diameter. In the original attempts to remove the foreign body the inkpot had been smashed, and eventually it was removed in pieces with considerable difficulty. The rectum was badly lacerated, and the patient had two secondary hæmorrhages. He made a good recovery. Bottles, glasses, and even a potato, have been removed from the rectum.

Treatment.—It is impossible to describe the treatment for the removal of foreign bodies from the rectum and colon, as this must depend upon the nature of the article itself. Some have been removed by most ingenious means. Too often a great deal of damage to the rectum results from unskilful attempts to remove foreign bodies, which tend to break and form sharp edges, or are difficult to get hold of. If an attempt is to be made to remove a foreign body from the rectum, the patient should be given a spinal anæsthetic, so as to obtain complete relaxation of the muscles. This will facilitate the removal and prevent damage to the rectum and anus. The best method, when confronted with a large or dangerous foreign body in the rectum which cannot be got hold of, is to open the abdomen and press the foreign body down from above till it can be protruded at the anus and removed. This is much safer than dividing the sphincter, or attempting to drag it out from below. When the foreign body cannot be reached from the rectum, an X-ray photograph should be taken to ascertain its position, and it should be removed by laparotomy.

Birth of a Child by the Rectum.—Payne records the case of a woman of thirty-three in labour thirty-six hours in whom there was a congenital absence of the vaginal orifice. The child's head was presenting at the anus, and the child was delivered with forceps by this channel without difficulty.

Louis, the celebrated French surgeon, described the case of a young woman who had no vaginal opening, and regularly menstruated by the rectum. She allowed her lover to have connection with her in the only possible manner, which sufficed for impregnation, and at term she bore by the rectum a well-formed child.

Vallisneri reported a case of a woman with two uteri, one of which opened

into the vagina and the other into the rectum. She bore a child by the rectal uterus. Hunter reported a similar case.

Harrison has recorded a case in which a fœtus was delivered by the anus after rupture of the uterus. The uterus was cartilaginous and adherent. The woman recovered. Morisani has reported the case of a woman who was delivered by the rectum of an extra-uterine pregnancy.

It is not often that foreign bodies become stuck in the colon. As a rule, any foreign body that has been swallowed and succeeds in passing the ileocæcal valve will quite easily reach the rectum. A case, however, is recorded by McGavin of a hairpin which a patient had swallowed. It had become lodged in the ascending colon, from which it had to be removed by operation.

CHAPTER XXII

THE DIAGNOSIS OF DISEASE IN THE COLON

The symptoms of diseased states in the colon have already been discussed in Chapter II., together with the methods of direct examination, including examination with the sigmoidoscope. We have, however, to describe certain special methods of making or confirming the diagnosis in cases of suspected disease of the colon, as it is largely upon such methods that we are obliged to depend.

All these methods, with the exception of exploratory laparotomy, are unreliable, and too much importance should not be attached to them. But when one, or several, different indirect methods confirm suspicions already aroused on a clinical basis, or when all indirect methods point in one direction, such evidence assumes considerable importance in arriving at a diagnosis.

X-Ray Examination.

It is a mistake to suppose that an X-ray examination with a barium enema should be done before examining the rectum, or that it is any substitute for a local examination. X-ray examinations are only called for when the lesion is out of reach of the finger or any form of speculum. X-rays are particularly valuable in distinguishing between different kinds of constipation, and in all cases of chronic obstruction. Also in detecting malformations of the colon or misplacements of the bowel or its mesentery. X-ray photographs often give valuable information as to the exact position of a stricture in the large bowel, and are the best method of diagnosing *diverticulitis*. *Filling defects due to new growths can sometimes be seen*, and afford valuable evidence. When a filling defect is suspected, screen examination under the rays is of particular importance, as the point at which the delay to the enema occurs can be watched.

As an aid in diagnosis X-ray examinations are of great value if properly interpreted, and if undue reliance is not placed upon them. The examination must be very well done, and I have no hesitation in saying that something like 60 per cent. of X-ray photographs of the rectum and colon are worthless, owing to their not being properly done or the apparatus not being powerful enough.

The normal colon does not give rise to any shadow on the plate, and when X rays first began to be used for diagnosing lesions in the bowel,

the method was to give a bismuth meal and watch its progress through the alimentary canal. By watching such meals in normal individuals a comparison could be made, and undue delay in the passage of the bismuth along the canal was supposed to show the presence of an obstructive lesion at the point of greatest delay. It was soon realized, however, that this method is fallacious. The point of maximum delay does not necessarily correspond with the cause of that delay, which may be much further on. Moreover, there are other sources of error. The normal variation is very considerable, and spasm cannot be distinguished from mechanical block. It was soon seen that alteration in the normal outlines of the bowel is of much more importance than delay. A constant alteration in the normal outline on repeated examinations is fairly definite evidence of a lesion. A definite filling defect at one spot, if confirmed by subsequent examination, is most suggestive of a malignant ulcer. The great difficulty of obtaining good photographs of filling defects and of distinguishing between spasm and mechanical obstruction soon led to the practice of using barium enemata in place of meals. This proved a great advance on the older method.

The barium is mixed in a very thin emulsion with buttermilk, or some other suitable vehicle, to insure that it passes readily into all parts of the large bowel, and an enema-tube is passed into the rectum for a few inches. The patient is then placed on the X-ray couch on his or her back and the enema fluid is run in under slight pressure, while its progress through the colon is being watched through the fluorescent screen under the rays and photographs taken of any abnormality. A tap is provided for stopping the fluid at any moment if it is desired to take a photograph. In this way the outline of the bowel can be very carefully studied, and if a filling defect is seen it is tested for spasm by raising the fluid receptacle so as to exert a steady pressure. If the condition is one of spasm it will generally relax in a few moments. With proper care it is possible to outline the bowel completely, and to demonstrate any filling defect with considerable accuracy. The mobility of any part of the colon is tested by palpating the abdomen under the screen, or by tilting the patient from side to side. Fixation of the bowel can also be tested by taking two photographs in quick succession on the same plate. The colon wall is more or less in constant movement from peristalsis and respiration, and this photograph will show a double outline to the bowel except where it is fixed by adhesions. This was first pointed out by Graham Hodgson.

If a marked alteration in the normal outline is observed or a filling defect seen, the photograph should be repeated on another occasion, preferably next day, and a good plan is to administer a dose of belladonna or atropin some little time before the second observation is made in order to relax any spasm. If, then, the same abnormality is observed on two

separate occasions, and one of these was while the patient was under the influence of belladonna, we can be fairly certain that a definite lesion exists and is not due to spasm. If *diverticulitis* is present, it can be readily distinguished from carcinoma by the characteristic appearance of the injected diverticula. These are best seen if the patient is examined



FIG 166.—X-RAY PHOTOGRAPH, SHOWING A FILLING DEFECT IN THE PELVIC COLON

The rectum and lower coil of the colon are distended with barium, and a point can be seen beyond which the fluid will not flow Operation revealed a carcinomatous growth at this point

after the evacuation of the barium enema, when the outlines of the pouches will not be confused by the barium within the lumen.

Very satisfactory evidence of growths in the colon can be secured in this manner, but there are many fallacies. It is only when the photographs are taken with great care and repeated as outlined above that we can

rely upon them. A single observation, unconfirmed, is of little value. Also it is of the utmost importance that very powerful X-ray apparatus is used. The latter should be capable of taking a photograph of the colon in one-tenth of a second. Even when every care has been exercised it has to be remembered that the photographs are only those of shadows, and

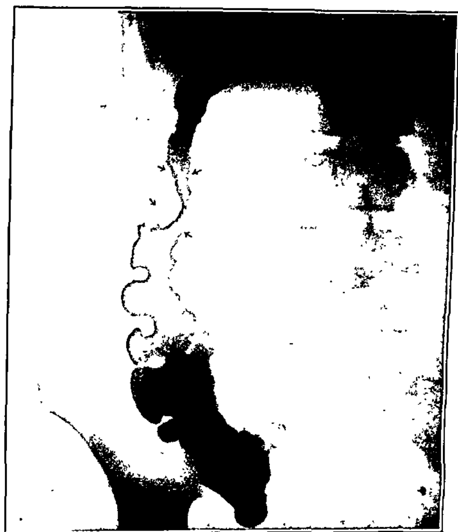


FIG 167.—X RAY OF BARIUM MEAL, SHOWING FILLING DEFECT IN ASCENDING COLON

This appeared in repeated photographs, and at operation was found to be due to a carcinoma.

too great reliance cannot be placed upon them. Negative results—that is to say, failure to find a filling defect or abnormal points of outline in the colon—cannot be taken as proving that there is no growth present. I have *on many occasions found growths in patients who had been assured on* such X-ray evidence that nothing was there. The filling defect, if present, will often have a double outline if due to a cancerous ulcer, as the greatest

narrowing occurs at the upper and lower edges of the ulcer. If the growth is of the papillomatous variety and projects markedly into the bowel lumen, the filling defect will tend to have a curved outline with the concavity of the curve towards the growth (see Fig. 167). A distinct and well-marked notch in the wall of the colon with some fixation of the wall may be all that is seen in some cases.

In cases of diverticulitis the X rays enable a positive diagnosis to be made with ease and certainty, providing the photographs are well enough taken, with a first-class apparatus. The appearance of the diverticula under the rays is very characteristic, more especially if the photograph is taken after the evacuation of the enema has removed the shadow of the bowel lumen.

In cases of volvulus and mega-colon, X-ray examinations give valuable information as to the cause and extent of the lesion. In cases of adhesions and obstruction by bands, X rays are a decided help, but the photographs are much more difficult to interpret.

Barium Meal.—Though as a rule a barium enema gives the best results when diagnosing lesions in the large bowel, photographs taken after a barium meal are often also useful.

The normal times for the bismuth to reach different parts of the colon are given by Hurst as follows: To reach the cæcum 4½ hours, hepatic flexure 6½ hours, splenic flexure 9 hours, sigmoid flexure about 12 hours. Considerable variations from these times occur in different subjects quite apart from the presence of any abnormality.

The patient should, as a rule, be screened both in the recumbent and in the erect position, so as to ascertain if there is any unnatural change in the position of the colon as a result of posture.

Charcoal Test.—The charcoal test which I suggested many years ago is a rough, but sometimes useful guide, which can be very readily used, and does not necessitate any apparatus or special skill. It consists in giving the patient a fairly large dose of charcoal (*Carbonis lign:*) with his or her breakfast, and observing when the black colour of the stools is first observed. A couple of teaspoonfuls of powdered charcoal in an ounce or two of milk is a convenient way of administering it. In a normal person the charcoal should appear in the stools the next morning, or at any rate the next day, and should have almost disappeared the following day. Slight variation of this may be discounted, but if two or three days elapse before the appearance of the charcoal, and if it continues to appear for several days afterwards, it is clear that there is abnormal delay in the passage of the colonic contents which requires further investigation.

Diagnosis by Means of Rectal Bougies and Tubes.

The use of rectal bougies for the diagnosis of strictures in the bowel was at one time very popular, but they have now been entirely replaced by the *sigmoidoscope and similar instruments.* It is well that it is so, for the use of bougies is by no means free from danger, and there have been numerous accidents due to perforation of the bowel wall; moreover, they are of very little value in diagnosis, as the end may easily be arrested by one of the rectal valves, and so give the impression that a stricture exists, when as a *matter of fact there is none.*

Diagnoses based on the passage of a rectal tube are quite valueless. One not uncommonly hears it stated that a patient in whose colon the presence of a stricture is suspected has no stricture in the sigmoid flexure, because a rectal tube has easily been passed for 2 feet. This, however, *proves nothing, as the tube usually curls* up *in* the rectum, and *although* 2 feet of it have been introduced, the end may lie just within the anus. Anyone who doubts this statement has only to examine the patient with X rays, after passing the tube, to be convinced; they will see the tube coiled up in the rectal ampulla.

The only way in which a long tube can with certainty be introduced into the colon is by passing it through the sigmoidoscope.

Examination under an Anæsthetic.

This is a most valuable aid to diagnosis in difficult cases. With the abdominal muscles well relaxed, the whole colon can be palpated, and if a tumour is present it can usually be felt. A bimanual examination should also be made with two fingers in the rectum. If the sphincters are slightly stretched, the two first fingers of the right *hand can easily be passed into* the bowel, and this allows one to reach nearly an inch higher than if only one finger is employed. By bimanual examination, growths in the lower third of the sigmoid can usually be felt through the anterior rectal wall. Abscesses in the iliac fossæ can also be felt and the pelvic organs explored.

The examination should first be made with the patient lying on his back, and he should then be turned over on his side and the knees well drawn up. The examination should then be repeated. The change in attitude may allow a tumour to fall forward into a position in which it can be more easily felt; also, when a tumour has already been detected, valuable information as to its mobility or otherwise is afforded by palpation with the patient in different positions.

Exploratory Laparotomy.

This should not often be necessary, and if the patient has been carefully examined by the means already mentioned an approximate diagnosis will generally have been made. We sometimes meet with cases where symp-

toms point very strongly to the presence of a growth or some gross lesion in some part of the colon, but the most careful examination fails to show where the lesion is or to confirm its presence. This is particularly liable to happen where the lesion is in the splenic flexure, the transverse colon, or the hepatic flexure, places which are inaccessible to the ordinary means of diagnosis. It is obviously wrong to wait for the presence of a definite tumour, as our whole object is to get the lesion in as early a stage as possible, and it is the duty of the surgeon in such cases to advocate an exploratory laparotomy. If nothing is found the patient's life will not have been jeopardized, while if a slight risk is not taken a serious lesion or growth may easily be missed at a time when treatment might have been successful.

Where there are good reasons for believing that a lesion exists in the colon which can only be remedied by operation, we should unhesitatingly advise an exploratory laparotomy.

The two following instances demonstrate the value of such a procedure:

Case.—Mr. A——, a gentleman aged forty-six, was brought to me by a physician suffering from a tendency to loose stools, which contained jelly-like blood and mucus. The history of this condition extended over some two months. There had been some slight constipation, and he had complained of colicky pains in the middle of the abdomen. He had no other symptoms. A most careful examination entirely failed to show any lesion. I advised an exploratory laparotomy, which the patient agreed to. On opening the abdomen, a small growth the size of a two-shilling piece was found at the apex of the splenic angle. The splenic angle was successfully resected, and the patient made a good recovery, and was in good health three years later.

Case.—Mr. F——, aged thirty, was brought to me by his physician with symptoms of ulcerative colitis, general loss of health, and bleeding and mucus in the stools. He had been under treatment for some time without improving. An examination with the sigmoidoscope showed no signs of ulceration in the colon, nor could any lesion be discovered to account for the condition. An exploratory laparotomy was advised, and a careful search showed a small carcinoma at the splenic angle. This was successfully resected, and the patient made a good recovery, and is well ten years later.

Examination of the Stools.

This is always an important factor in diagnosis, and should never be omitted. The shape and character of the deposits should be noted. Liquid stools, except when aperients are taken, are always a sign of something abnormal. Constant fluid fæces, mixed with jelly-like mucus, generally result from a stricture or ulceration in the bowel.

Much importance is often attached to the shape of the fæces when solid. Thus it is stated that ribbon-like or "pipe-stem" fæces indicate a stricture or narrowing in the bowel. This is a most fallacious argument. Though it is true that if a stricture exists at the anal opening the fæces may be flattened or otherwise altered in shape, a stricture higher up in the bowel cannot affect the shape of the fæces, as the mass would inevitably be reformed in the rectal ampulla, and must take its shape from the last narrow opening through which it passes—the anus.

The shape and form of the fæces are of little, if any, diagnostic value.

The presence of abnormal constituents is important. Mucus is normally present in the stools, but not in sufficient quantity to be obvious. The presence of large quantities of mucus is indicative of some irritative lesion. Much importance is often attached to the form in which the mucus is found, whether it be in that of slime, shreds, or casts. It is doubtful, however, whether we can attach any significance to its form. A patient will at one time pass jelly-like mucus and at another well-formed casts or membranes. I have seen large casts passed by patients who were suffering from cancer of the sigmoid. The exact reason for the mucus forming casts in some cases and not in others is not understood, and we are not justified in drawing any conclusions from their presence.

A distinction is sometimes drawn between the mucus found in cases of colitis and in cases of malignant ulceration, and it is asserted that mucous casts are characteristic of colitis, as opposed to malignant disease. It must be remembered, however, that the two conditions may, and not infrequently do, co-exist in the same patient. It is not safe to assume that because a patient is passing mucous casts the case is one of simple colitis. I had recently to examine a patient supposed to be suffering from colitis in whose stools large mucous casts were present. On examining her with the sigmoidoscope, a large malignant ulcer in the sigmoid flexure was detected.

Laboratory Tests.

I am indebted to Dr. Cuthbert Dukes for the following description: There are four main laboratory tests of the fæces which are of value in the diagnosis of intestinal diseases—namely, the examination of the fæces for occult blood, the microscopic examination of the fæces for pus and protozoa, the bacteriological examination of the fæces, and the general chemical and microscopical examination after a test diet. For each of these tests it is important that the specimen should be sent to the laboratory as soon as possible after it has been passed.

The stool should be collected in a clean receptacle, and a spoonful transferred to a specimen bottle for transmission to the laboratory. Special outfits for this purpose are provided by pathologists. Preliminary

preparation of the patient is advisable before each of these tests, although this may be omitted in cases of urgency. Before the occult blood test it is sometimes advisable to put the patient on a vegetarian diet for a couple of days before the specimen is collected. In the examination for protozoa the all-important instruction is to get the specimen to the laboratory as soon as possible, and it is better not to give the patient a purgative in advance. For bacteriological examination, on the other hand, it is essential to secure a liquid motion, so that if the motions are solid a saline purgative should be given in advance. In examination carried out after the test diet, the instructions for this test must be followed faithfully.

1. *Occult Blood Tests.*—Tests for blood are very important in cases of suspected cancer of the colon. A repeated finding of blood, if piles can be eliminated as a source, is very strong presumptive evidence of a growth. Unfortunately there are many sources of error.

There are a number of ways of testing for occult blood in the stools. The actual methods used vary in different laboratories, but it may be of value to give those which are in common use at St. Mark's Hospital.

The three chief tests for small quantities of blood in the fæces are: (1) Microscopic examination for red blood-corpuscles. (2) Chemical tests for occult blood. (3) Spectroscopic tests for blood-pigment.

(1) The recognition of red blood-corpuscles by microscopic examination in a saline suspension of fæces is not any easy task. Considerable experience is necessary to distinguish red blood-corpuscles from yeast cells and other living and dead matter of approximately the same size and shape.

(2) For the performance of the chemical tests a small piece of the stool should be mixed with water and then shaken with an equal volume of ether to remove the fat. The ether is discarded, and the remaining watery suspension treated with one-third its volume of glacial acetic acid and extracted with 10 c.c. of ether. The reason for these manipulations is that blood-pigment is insoluble in neutral ether, but readily soluble in acidified ether. If the ether does not separate well, add about half its volume of alcohol and mix. The ethereal extract obtained is examined with the guaiac, benzidene, and spectroscopic tests.

For the performance of the guaiac test a 1-60 alcoholic solution of gum guaiac is prepared, and 2 c.c. of the ethereal extract, the guaiac solution, and hydrogen peroxide are mixed together. If hæmoglobin is present a blue colour will develop in the hydrogen peroxide, or in the zone of contact, in a few minutes. The test should never be relied on as the sole test for blood, but is of value in relation to the other tests.

The reagents employed for the benzidene test are hydrogen peroxide and a saturated solution of benzidene in glacial acetic acid. Equal quantities of these and the ethereal extract of the fæces are mixed together,

A blue colour appears in the presence of hæmoglobin. The test is more sensitive than the guaiac test.

(3) The spectroscopic test need not be carried out as a routine, but may be useful in doubtful cases. For spectroscopic examination it is best to treat the ethereal extract so as to produce hæmochromogen, which gives a narrow, very distinct band between D and E, and if not too diluted a fainter band between E and B.

In all cases in which a positive reaction to these blood tests is obtained when the patient is on a full diet, the test should be repeated after the patient has been on a vegetarian diet for three or four days.

2. *Examination of Fæces for Protozoa.*—The specimen of fæces should be examined as soon as possible after being passed. Protozoa lose their motility within an hour or two of leaving the intestine, but cysts can still be recognized after two or three days. A violent purgative should not be given before the test, because this tends to evacuate protozoa in the precystic stage, when they are very difficult to recognize microscopically.

About half a dozen fresh preparations should be made by rubbing up a fragment of the fæces with normal saline, and another series with Lugol's solution. No. 1 cover glasses should be used, and the preparations must not be too thick. If a warm stage is not available, the saline preparations not being examined are conveniently kept warm on the microscope lamp. The saline preparations should first be rapidly surveyed with the ⅙ inch objective to try and catch the characteristic movement of *Entamœba histolytica* or *E. coli*, or the flagellates. Suspicious fields can be studied with the $\frac{1}{12}$ inch objective. The iodine preparation is used chiefly in the search for cysts, and an oil immersion examination of suspicious bodies seen with the ⅙ inch is nearly always necessary. It is a good rule never to diagnose *E. histolytica* in the saline preparation unless the characteristic movement is observed, and to make careful measurements of cysts seen in the iodine preparation.

Specimens of fæces in which protozoa or their cysts have been seen may be examined in stained films. This may be necessary for the identification of protozoa or flagellates seen in the wet preparation, but is not worth undertaking unless something has already been seen which demands further study.

Thin films are made on cover slips or slides and fixed without allowing the film to dry. A good fixative is saturated solution of $HgCl_2$ in distilled water 2 parts, 96 per cent. alcohol 1 part to every 100 c.c. of which 5 c.c. of glacial acetic acid is added. This solution can be kept. Films are fixed by allowing them to lie face downwards in this solution for twenty minutes. The slides are then transferred to 50 per cent. alcohol, then 70 per cent. alcohol containing a few drops of iodine solution, in which they remain for ten minutes. The actual staining is preceded by bringing the

films down through 70, 50, and 30 per cent. alcohol. They are stained for five to twenty minutes in Mayer's hæmalum, which should be of a rich red colour. Mayer's hæmalum is best compounded as follows:

Hæmatoxylin (crystals)	1 gramme.
Distilled water	1 litre.

Dissolve and add:

Potash alum	50 grammes.
Sodium iodate	0·2 gramme.

When solution is complete, filter.

After staining, the films appear pinkish, and they should be held in running tap water until blue. Dehydrate and mount in Canada balsam. (Good illustrations of intestinal protozoa are published in "The Intestinal Protozoa of Man," by Dobell and O'Connor.)

3. *Bacteriological Examination of the Fæces.*—The types of infection in which bacteriological examination of the fæces is most useful are typhoid and paratyphoid fever, dysentery, food poisoning, tuberculosis, sprue, and other tropical diseases. It is sometimes of value also to estimate the relative proportions of the different groups of bacteria normally present in the excreta, such as *B. coli*, streptococci, and anaerobes. The results of such examinations must be accepted in a critical spirit. The alleged excess of streptococci which has been reported as characteristic of certain types of colitis is generally due to the fact that the motions are liquid, under which circumstances streptococci are always more numerous than in solid motions. Other groups of bacteria which have been suspected as being responsible for intestinal disease are the late lactose fermenting coliform bacilli and the so-called para-enteritidis or para-Gaertner group. These bacteria are certainly more numerous in the stools of patients suffering from inflammatory diseases of the intestine, but on the whole the evidence is more in favour of the view that the presence of these bacteria is the result of the altered intestinal conditions and not the actual cause.

The Use of Vaccines prepared from Organisms found in the Stools.—Though it is frequently asserted that vaccines prepared in this manner are of use in treating cases of bowel trouble, especially colitis, there is no sound clinical proof of the value of such treatment. The pathogenicity of organisms found in the stools cannot be estimated with any accuracy, and it has been my experience that little benefit to the patient results from the use of such vaccines.

4. *Examination after Test Diet.*—Examination of the stools after the patient has been on a special diet for two or three days is a method which was introduced by Schmidt to test the physiological function of the intestines. The patient is kept on a special diet for three days, and then a specimen of fæces is collected and examined by chemical, microscopical,

and bacteriological tests. If the diet is standardized in this way, it is easier to assess the significance of the different constituents of the excreta.

The modified Schmidt test diet, as used at St. Mark's Hospital, is as follows:

Breakfast: A dish of oatmeal gruel cooked in milk and strained (salt or sugar as desired). Soft-boiled egg and roll and butter. Tea.

Midday meal: About 4 ounces of underdone steak or roast beef. Mashed potatoes and butter.

Tea: Same as at breakfast, but without egg.

Evening meal: One pint of milk or a plate of vegetable soup. One or two soft-boiled eggs and roll and butter.

This diet must be followed strictly for three days. The stools passed on the first and second days are not to be examined and need not be preserved. The first movement of the bowels on the fourth day should be collected in a clean vessel, and a representative portion transferred to the specimen-tube. This must be sent to the laboratory immediately. No aperient medicines are to be taken before the specimen is collected, but if the bowels do not move each day a glycerine suppository should be used in the evening.

The result of the test meal analysis is set out in the following form:

Macroscopic Examination.—A representative sample of the fæces is taken with a wooden spatula and triturated with water in a mortar until the mass is of the consistency of soup. This is poured out into a large Petri dish, which is examined over a black tile. Any particles of the test diet voided in a form visible to the unaided eye are now detectable, and particular search is made for connective tissue of the meat, particles of muscle, potato remnants, fat and cellulose residue. The recognition of mucus is much facilitated by shining the light from a microscope lamp through the Petri dish from below. Suspicious particles should be removed with a platinum loop or forceps and their nature verified by microscopic examination.

Chemical Examination.—The reaction is tested with litmus paper.

For the recognition of fæcal pigments half a watch-glass full of the triturated fæcal mass is mixed with an equal quantity of concentrated aqueous sublimate solution (corrosive sublimate 25, sodium chloride 25, and distilled water 100). The normal fæcal pigment, hydrobilirubin, stains deep red with mercuric chloride, whilst pathologically unchanged bilirubin stains intensely green owing to the oxidation of bilirubin to biliverdin. The mixture should be allowed to stand for twenty-four hours and the presence of any green tint noted, and whether it appears quickly or after an interval.

Schmidt's incubator test was designed to detect carbohydrate fermentation or protein putrefaction. Three wide-mouthed bottles are connected

by glass tubing through perforated rubber stoppers. The fæcal suspension is poured into the first bottle until two-thirds full. The second bottle is half filled with water and the third remains empty. The apparatus is kept in the incubator for twenty-four hours at 37° C.

In the presence of fermentation or putrefaction the generated gas forces the water with some of the fæces into the third bottle. The degree of decomposition is determined by the quantity of water in the third bottle. When the test diet fæces are normal, the second and third bottles remain the same as when placed in the incubator. With carbohydrate fermentation some of the yellow fæces are forced into the two other bottles. The fæces are usually darker in the presence of putrefaction.

Microscopic Examination.—The particles removed for microscopic examination when the suspension is examined with the unaided eye are studied with the $\frac{2}{3}$ and $\frac{1}{6}$ inch objective. Suspensions of the fæces are made also in saline and in Lugol's iodine, and the presence of the following noted: *Connective tissue, muscle, starch (staining blue with iodine), fat,* mucus, blood, pus, protozoa or their cysts, and ova of helminths.

CHAPTER XXIII

CONGENITAL ABNORMALITIES OF THE COLON

CONGENITAL abnormalities of the colon may be conveniently divided into congenital abnormalities of the colon itself and congenital abnormalities of the peritoneum or mesentery.

The colon, or some part of it, may be completely absent, or represented only by a fibrous cord. Some form of atresia is the commonest condition met with. Thus, some portion of the colon may be represented only by a narrow tube. In Atkins's case the whole colon and rectum were rudimentary, and about the thickness of an ordinary quill, there being a small lumen, however, throughout the colon. The condition in this case was associated with imperforate anus.

In another case the ascending and transverse portions of the colon were represented by a narrow tube about the thickness of a lead pencil, while the remainder was normal, except for some annular contractions in the sigmoid. The condition in this case was associated with an hourglass contraction of the stomach, and a stricture of the ileum just above the ileocæcal valve, also of congenital origin.

A very interesting case was recorded by Anderson of an infant who was born with a fæcal fistula at the umbilicus and an imperforate anus. Post-mortem it was found that the fæcal fistula was formed by the ileum immediately above the ileocæcal valve being adherent to the umbilicus. The cæcum, ascending, transverse, and descending portions of the colon were present, but the descending colon ended in a blind extremity. There was no trace of any sigmoid flexure or rectum.

A case is recorded by Lockwood in which the descending colon was double. The two tubes were parallel with each other, and both were provided with a lumen and appendices epiploicæ; one was, however, very small, while the other was of fair diameter and performed the functions of the descending colon. The patient was a man, aged fifty-seven, who died at St. Bartholomew's Hospital from intestinal obstruction. There was a malignant growth at the lower end of the descending colon at the spot at which the two tubes appeared to join again.

Congenital stenosis of the colon is very rare, but there are several cases on record. The stenosis may consist of a diaphragm or may take a tubular form. In a few instances more than one stricture has been present. The commonest congenital abnormalities of the colon are those in which

there has been some failure in the descent of the cæcum, or rather where the normal development of the peritoneal connections of the colon has been arrested. It is obvious, from a study of the development of the colon in relation to its peritoneal attachments, that any abnormality may exist between the colon being represented by a practically straight tube and the normal condition.

If arrest of development takes place at a very early date, the colon will be represented by a practically straight tube between the umbilicus and the rectum.

The cæcum may be situated in the left side of the abdomen (quite apart from complete transposition of the viscera). This may occur in two ways: (1) From arrested development at an early stage before the cæcum has passed across to the right hypochondrium; or (2) from persistence of the cæcal mesentery allowing the cæcum to migrate to the left side.

In Simpson's case the cæcum was retained in an umbilical hernia by adhesions, the result of intra-uterine inflammation, and the colon retained the primitive form of a straight tube. There is a specimen of a similar case in the museum of the Royal College of Surgeons.

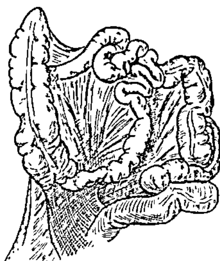


Fig 168.—Drawing showing a Common Mesentery to the Cæcum and Ileum.
This is a congenital abnormality which predisposes to volvulus of the cæcal angle. The cæcum has been turned up. (After Alglave)

The cæcum may be found on the left side of the abdomen near the spleen, and the transverse colon be absent. Several such cases have been recorded, and in most of them it is stated that the cæcum was fixed by adhesions. It seems probable that the original lesion was an abnormal mesentery to the cæcum, which allowed it to migrate to the left side of the abdomen, where it became fixed by adhesions.

A more common condition is for the cæcum to fail to descend into the right iliac fossa, and to remain just beneath the liver. This condition is normally present in many mammals. In such cases the ascending colon is unrepresented, and the cæcum communicates directly with the transverse colon. In the male the non-descent of the cæcum is often associated with imperfect descent of the right testicle.

A very curious case was reported by Elliott Smith, in which the cæcum, as such, appeared to be absent. The ileum passed insensibly into the ascending colon without any trace of an ileocæcal valve, and the colon

had a gradual curve throughout, there being no hepatic or splenic angle. The whole colon was provided with a mesentery. The appendix was present in the shape of a solid cord.

I have met with a similar case. The patient was a woman, and there was no cæcum or ascending colon. The ileum joined on to the right side of the transverse colon, and at this spot there was a short blind projection which appeared to represent the appendix. *There was no ileocæcal valve.*

The Sigmoid Flexure opening into the Rectum on the Right Side.—This is a not uncommon congenital abnormality of the colon, and is probably present in about 4 per cent. of all cases. Out of twenty-one newly-born infants dissected by Curling, the sigmoid joined the rectum on the right side in two. It is a condition well recognized by surgeons, as it is a cause of considerable embarrassment when attempting to perform a left inguinal colostomy in such cases.

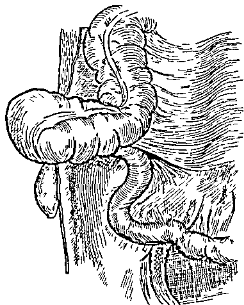


FIG. 169.—A CONGENITAL ABNORMALITY OF THE PERITONEUM

The cæcum is freely movable, and the last few inches of the ileum are fixed. This may result in volvulus. (After Alglave.)

Cæcum and Ascending Colon having a Mesentery.—Perhaps the commonest form of congenital abnormality of the colon is that in which the primitive arrangement of the peritoneum attaching the cæcum and ascending colon to the posterior abdominal wall has persisted. *The condition varies from* the cæcum alone having a short and complete mesentery to that in which the cæcum and ascending colon, and half the transverse colon, have a common mesentery with the whole of the small intestine. Any condition between these two extremes may be met with, and that in which the cæcum has a short mesentery is comparatively common.

The cæcum in such cases may have a mesocolon 5 inches or more in length, and may be free to move about the abdominal cavity. In the cases in which it possesses, together with the ascending colon and right half of the transverse colon, a common mesentery with the small bowel, the cæcal angle of the colon (as it may be called) occupies a more or less central position in the abdomen.

This condition is very liable to result in the formation of a volvulus, often of a most complicated character. It is further considered in the chapter on volvulus.

Treatment of Congenital Abnormalities.

Many of the congenital abnormalities of the colon which have been mentioned, such as complete atresia and absence of some portion of the large bowel, are quite incompatible with life, and are beyond the scope of surgical interference.

Most of the abnormalities are of practical interest chiefly because they give rise to difficulties in operating upon the colon, or because they are liable to result in volvulus. Apart from the complications which they may cause, they are seldom, if ever, diagnosed during life, and there is therefore no indication for attempting to correct them by surgical means.

The displacements of the cæcum and sigmoid are, however, of considerable practical importance to the surgeon, as, should the necessity arise in such a case for the performance of a colostomy, their presence may render the operation most difficult, and sometimes impossible.

This was more especially the case in the days when lumbar colostomy was the usual operation, though considerable difficulty may result when performing an inguinal colostomy if the colon is not found in its usual position.

Megacolon.

Probably the earliest recorded case, and certainly the first in which an operation was performed, is that reported by Bright in 1838. The real cause of the condition was detected by this astute observer, but he labelled the case "phantom tumour."

The condition is a very rare one, but probably not so uncommon as hospital records seem to prove. It is most frequently met with in children, but may be encountered at any age, as it is not necessarily fatal.

A great deal of uncertainty still exists as to the nature and causes of this disease, and it has been described under several names, such as "Hirschsprung's disease," "idiopathic dilatation of the colon," and "congenital dilatation of the colon." The name used here, however, is that which best describes the condition.

Symptoms.—The chief symptoms are enormous distension of the abdomen, and severe and intractable constipation. In most of the cases one or both of these symptoms are noticed within a few days or weeks of birth.

In several instances no meconium has been passed for three or four days after birth, and there has subsequently been increasing difficulty in relieving the bowels.

Usually constipation is the first symptom, and distension of the abdomen is only manifest later; but in at least one instance the child was born with a distended abdomen, while in another case the distension was

first noticed when the child was a few weeks old, and the constipation not till the age of three years.

The distension is the most marked characteristic. One child six months old measured $23\frac{1}{2}$ inches in girth at the umbilicus; a boy aged eleven years had a girth of 3 feet 11 inches.

Formard has described a case in which the patient, a man, earned his living as a freak at shows. He was called the " balloon man " on account of the enormous size of his abdomen. In several cases girls suffering from the disease have been suspected of pregnancy, owing to the size of their abdomens. The distension is mainly due to flatus, and the abdomen is always hyper-resonant. In extreme cases the splenic dulness is obliterated, and the liver dulness much diminished.

The distension is usually considerably diminished by an action of the bowels, but it is seldom completely relieved, and usually soon reappears.

When there is great distension, secondary symptoms occur from pressure upon other organs and upon the diaphragm. There may be marked shortness of breath and dyspnœa, the patient during the height of the distension being livid in the face from the embarrassed respiration. Palpitation may occur from displacement of the heart, and the circulatory system may be seriously interfered with. The pressure results in great enlargement of the superficial veins of the abdomen, and in some cases has caused œdema of the legs. The kidneys may be damaged, and albuminuria is sometimes present.

The constipation is very intractable, the bowels often remaining unrelieved for days and weeks, in spite of the energetic employment of aperients and enemata. One patient who for many years attended St. Mark's Hospital only had an action of the bowels about thirteen times a year.

One patient of mine, a woman aged thirty, has on two occasions presented herself because she had had no action of the bowels for a period of three months. In spite of this she was in good health, with a clean tongue and clear skin. Her only trouble was the enormous size of her abdomen and its weight.

On one occasion she was eight months pregnant as well, but a healthy child was born at full time.

This woman was relieved by repeated enemata, assisted by large doses of belladonna.

She is always very constipated, but gets along all right, often for several years, and then gets into difficulties and has to be taken into hospital.

In those cases which survive the first few years of life there is a tendency for the symptoms to occur in periodic attacks, the patient often going months and even years without suffering any serious inconvenience from the condition; but constipation and unusual distension of the abdomen

persist throughout. When an attack comes on, the abdomen becomes progressively more distended, and the bowels refuse to act. In some cases the patient goes weeks, and even months, without any action of the bowels. Sometimes the attack terminates in a copious action of the bowels, which relieves the symptoms, to be followed in a few weeks or months by another similar attack.

The constipation may be so severe as to cause typical symptoms of intestinal obstruction; the patient vomits and suffers severe pain in the abdomen. Great coils of distended colon can be seen moving about through the stretched abdominal wall. In many cases an operation has been necessary to relieve the obstruction, and several patients have died from obstruction.

In a few cases the bowels have only been relieved by the administration of chloroform. One of the author's patients, a man of twenty-three, was on three occasions relieved in this way, an immense mass of fæcal material coming away under the effect of the anæsthetic.

The constipation is usually characterized by long intervals during which there is no action of the bowels, followed by copious stools. Sometimes, however, there is spurious diarrhœa, small stools occurring at frequent intervals without any actual relief.

The health of the patient may suffer considerably, and there is often serious emaciation and anæmia. Often, however, except during the attacks of obstruction, the patient suffers no inconvenience, and even when the bowels have not acted for a long time there are no toxæmic symptoms.

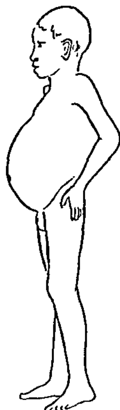


Fig. 170.—A Boy, aged Eleven, with Congenital Dilatation and Hypertrophy of the Colon. (After Osler)

In children the distension of the abdomen during development usually results in the lower ribs being much pushed out, so that there is a quite abnormal width of the lower part of the chest.

Diagnosis.—This rests mainly upon the history of severe constipation accompanied by distension of the abdomen from birth or childhood, and the presence of an enormously dilated colon. Examination of the abdomen reveals great distension and tympanites. The lower angle of the ribs is flattened, and the chest pushed out at the sides in extreme cases.

In ten there was a congenital abnormality of the anus, in two a congenital stricture of the colon; two were deaf-mutes, and one an imbecile.

Morbid Anatomy.—The essential condition that is always present is great dilatation of the whole or part of the colon, accompanied by much thickening and hypertrophy of the dilated portion.

The dilatation is in all cases enormous, so that as a rule almost the entire abdominal cavity is occupied by the dilated portion of the colon, and on opening the abdomen nothing can be seen but the huge sac formed by the

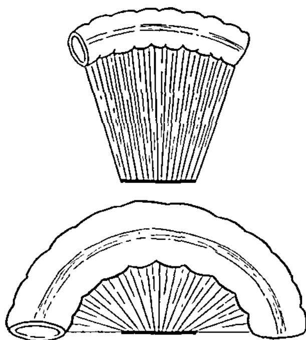


FIG 173.—DIAGRAM TO SHOW THE SECONDARY RESULTS OF DILATATION OF THE COLON

As the colon becomes dilated the mesocolon is shortened, and as the attachment of the mesocolon (shown by the black line) remains the same, the elongation of the colon which accompanies dilatation causes the curvature of the colon to be much exaggerated. The upper figure shows the normal and the lower the dilated bowel.

dilated bowel. The small intestines are not involved in the dilatation, but are usually found pushed into the back of the abdomen and collapsed.

The bowel is not only dilated, but also elongated, which results in its assuming abnormal and often acute flexures and kinks. This elongation is, however, limited to some extent by the mesentery, which prevents more than a certain limited amount of stretching in a longitudinal direction from taking place on that side of the bowel to which it is attached. The mesentery cannot, however, limit the longitudinal stretching of the colon on the side away from its attachment, and as a result this side becomes elongated to a much greater extent than the mesenteric side. The

affected portion of colon becomes markedly convex in its longitudinal axis, and assumes a shape like that of the stomach, with a lesser and a greater curvature. Thus, the dilated portion of the colon is often spoken of as forming a huge pouch, or else as resembling the stomach.

A further result is that the mesentery becomes considerably shortened, as the peritoneum is separated by the dilatation of the colon between its layers. This shortening, combined with the deformity produced by elongation, causes the dilated bowel to become much more fixed than is normally the case. The immobility of the colon is a well-marked feature when the abdomen is opened either at an operation for the relief of the condition or post-mortem. The dilated bowel cannot be pulled up or delivered out of the abdomen, or even moved about to any appreciable extent, unless it is first emptied of its contained gas. The dilated part of the colon varies in different cases. The entire colon, and the rectum to an inch above the anus, may be affected, or only one comparatively short portion.

In none of the cases I have collected have there been two separate and distinct dilatations in the same individual, and in none has the small bowel been affected.

The part most usually dilated is the sigmoid flexure alone; out of 100 cases, the dilatation involved the sigmoid alone in 51, while in 33 of the remainder it was involved together with other portions of the colon.

Thus, the sigmoid flexure was dilated in 84 out of 100 cases; the entire colon was dilated in 20, and in 9 of these the rectum was also involved in the dilatation; the transverse colon was the only part dilated in 2 cases, while it was involved with other parts in 36.

Parts of the Colon Affected

Sigmoid	51
Whole colon	20
Hepatic flexure to rectum	11
Hepatic flexure to sigmoid	1
Splenic flexure to rectum	2
Cæcum to splenic flexure	4
Transverse colon	2
Descending colon	1

Out of 19 cases recently collected at Great Ormond Street Hospital, 10 involved the rectum.

In some cases the dilatation begins and terminates abruptly; but in many the transition from the dilated to the normal portion of the colon is funnel-shaped.

The dilatation of the bowel is rightly spoken of as enormous; in an infant thirteen months old the diameter of the dilated portion of the colon was 5 inches; and in a boy of ten the diameter was 6 inches.

It is, of course, obvious that with such enormous dilatation and stretch-

ing of the bowel as occurs in these cases the anatomical relationships of the affected portion of bowel are entirely altered, so that the apex of the sigmoid flexure may be found to lie under the liver. In some cases the thoracic organs have been considerably displaced from the pushing up of the diaphragm and the widening of the angle of the lower ribs.

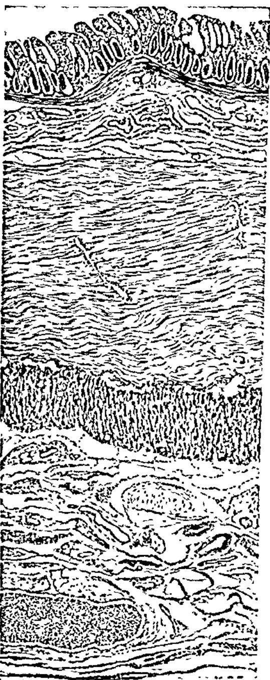


Fig. 174.—Microscopic Section of the Descending Colon in a Case of Megacolon in a Child

In addition to the dilatation, the bowel is also hypertrophied to a very marked degree, and this is quite as characteristic of the condition as the dilatation. The wall of the dilated portions of the colon is greatly thickened, in many cases being as much as ½ inch in thickness, and so tough that it feels like thick leather.

The thickening extends to the peritoneum covering the bowel, but is chiefly found in the muscular coats. Both the longitudinal and circular fibres are hypertrophied, and on cutting sections of the bowel wall the muscle fibres can be seen to be increased both in size and in number.

The mucous membrane takes little, if any, part in the general hypertrophy, but there is some thickening of the submucosa.

This hypertrophy of the bowel wall is not confined to the adult cases, but is also present in infants suffering from the condition.

Contents of the Dilated Bowel—These usually consist mainly of flatus, but very large quantities of fæcal material are present if the bowels have not acted for some time, and it is the accumulation of such

material in large quantities which causes the ultimate acute symptoms in most cases. In several cases large fæcal calculi have been found in the dilated loop. In a case recorded by Tuppier there was a calculus weighing 3 pounds.

Secondary Changes in the Dilated Loop.—Stercoral ulceration in the dilated loop sometimes occurs, but is quite uncommon; it was only present in 12 per cent. of the author's cases. Death has resulted from perforation in a few of the cases.

This curious condition is still a puzzle. The pathological condition that results points conclusively to something causing obstruction to the passage of fæcal material along the portion of the colon affected, but fails entirely to reveal any anatomical condition to account for the obstruction.

The probable explanation seems to be that there is a functional obstruction, probably of the nature of inhibition of peristalsis, in the section of gut involved, or in that part of the intestine immediately below it. We know from experimental evidence that in reversal experiments considerable dilatation of the bowel above the reversed section takes place. It seems possible that the congenital abnormality in these cases is one of function rather than of anatomy, which either results in the arrest of the peristaltic wave in some part of the colon or in actual retrograde peristalsis at this point, the result being that functional obstruction is produced, which tends to arrest the intestinal current and produces a secondary dilatation.

There seems little doubt that the morbid appearances are not the cause of the trouble, but the consequences of the functional obstruction. The hypertrophy of the muscle coats which is such a characteristic feature is clearly the result of the continual efforts of the bowel to evacuate the contents against an obstruction, and the enlargement of the bowel lumen is also secondary.

The most modern view of the etiology of this curious condition is that it results from a congenital defect of the nerve supply of the lower part of the colon and rectum, resulting in over-action of the inhibitory fibres of the lumbar sympathetic ganglia. It appears to bear a close relationship to congenital pyloric stenosis, Raynaud's disease, and erythromelalgia

Treatment—*Non operative Treatment.*—The non-operative treatment of this condition consists principally in getting the bowels to act regularly by the administration of enemas and aperients. Aperients are usually of little use, and enemata will have to be employed. Large enemata, if carefully administered, will in some cases keep the patient in comparative comfort; but they will have to be used daily in order to prevent accumulation of fæces in the dilated bowel. Belladonna is sometimes of more use than aperients, its action, no doubt, being to relieve spasm. The administration of morphia or chloroform will in some cases cause the bowels to act.

The best results are obtained by the regular administration of petroleum in sufficient quantity to render the contents of the colon nearly liquid. This should be assisted when the bowels fail to act with belladonna and an enema. Some four years ago two children, both about two and a half years of age, were brought to see me suffering from megacolon. They had very large abdomens, and their bowels only acted occasionally and after heroic measures. Both these children were treated by petroleum in full doses, assisted by an enema if they missed having an evacuation at the normal time, and belladonna was given by mouth whenever the abdomen became distended. The result in both these children was most satisfactory. One child is now apparently normal and has a daily evacuation, and her abdomen has not been distended for over a year. X rays, however, show that the pelvic colon is still abnormally large. The other child has also greatly improved, and has had no serious constipation for two years.

Quite recently Sheldon and Kern have reported three cases of megacolon treated by the administration of parathormone. From 10 to 20 units of parathormone were injected daily for three weeks, and 30 grains of calcium gluconate administered at the same time. There was rapid improvement in all three cases, the bowels acting without assistance and the distension of the colon subsiding. Other drugs which have also been recommended in the treatment of this condition are physostigmine and acetylcholine. To do any permanent good it would seem that these drugs must be administered continuously, which does not appear very desirable.

Operative Treatment.—The fact that these cases could be improved by sympathectomy was discovered more or less accidentally by Royle in 1927. Since then quite a number of cases have been treated by lumbar sympathectomy. Wade and Royle published their first case in 1927 of a boy of ten in whom marked improvement resulted from left lumbar sympathetic ramisection.

Since then a number of cases have been treated by this means, and it would seem that sympathectomy has established itself as a proper method of treating megacolon where the affected part of the colon is confined to the pelvic loop. The operation is not a dangerous one, and does not entail any interference with the bowel itself. It must, however, be done very carefully, as careless division of the sympathetic fibres might seriously interfere with the proper functioning of the bladder.

Wade divided the white ramus of the first lumbar nerve on the left side, all the mesial branches of the lumbar chain, and the trunk below the fourth ganglion. Judd and Anson excised the second, third, and fourth lumbar ganglia with the main sympathetic trunk. There is, however, a very free communication between the different nerve fibres, and it is difficult to be sure that all the sympathetic nerves to the affected colon have been divided. The method advocated by Gask is that which

is generally adopted now, in which all the areolar tissue is stripped off the front part of the aorta from an inch above the origin of the inferior mesenteric artery and the first inch of that vessel, and then down the aorta to the two iliac vessels. All the loose areolar tissue between the two iliac vessels is also removed at the same time.

The Operation.—The operation itself presents no special difficulty if only the pelvic colon is involved. A left oblique incision is made extending from the midline outwards towards the last rib. The anæsthesia should be a basal one, such as avertin or nembutal, and either regional or spinal anæsthesia to give complete relaxation of the abdominal wall. The rectus is displaced towards the right side and the peritoneum opened. The patient is then placed in the Trendelenburg position and the intestines packed off.

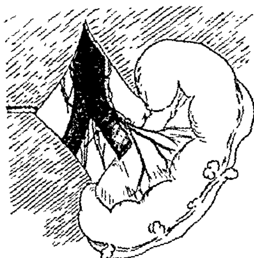


FIG 175.—DIAGRAM TO SHOW THE SYMPATHETIC PLEXUS AROUND THE INFERIOR MESENTERIC ARTERY AND THE BIFURCATION OF THE AORTA.
The posterior peritoneum has been incised and drawn apart.

The pelvic colon is drawn downwards and outwards, and the peritoneum over the bifurcation of the aorta is incised vertically, so that the lower part of the aorta and the inferior mesenteric artery can be exposed. The areolar tissue around the inferior mesenteric artery is removed with care, and the same is done to the areolar tissue on the aorta for an inch above this and downwards on to the two iliac arteries. The tissue between these latter arteries is also removed, and when all bleeding has been arrested the opening in the peritoneum is carefully stitched up again and the abdominal wound closed.

Results.—Quite a large number of cases of megacolon treated by sympathectomy have been reported. Some of the results can only be described as spectacular; the bowels have begun to act regularly and normally at once, and the patients, who before had the utmost difficulty in getting any

movement of the bowels, and often went weeks without relief, have become normal individuals, and have been relieved of all their symptoms. In some cases the results have not been so good, or the improvement has only been temporary, but we must remember that the operation is a new one, and the technique has differed considerably in the different cases. In some of the earlier cases it is probable that the sympathetic chain was not freely enough removed. There is sufficient evidence to show that in this operation we have discovered the correct means of remedying a condition in which previously surgery was practically helpless—a no small achievement.

The operation is a very new one, and none of the cases have been done long enough to enable us to know whether the results are permanent, and it is necessary to be cautious in evaluating them, but it is certainly a very great improvement on any treatment that previously existed. We do not know if the enlarged and hypertrophied colon is in time restored to a normal size, but it is reported that there is evident improvement in this respect in some of the cases when the colon is viewed with X rays.

An excellent paper on the anatomy of the sympathetic system appeared in the *British Journal of Surgery* for July, 1933, and anyone intending to perform the operation would be well advised to consult it.

Other Operative Procedures.—Appendicostomy has given very good results in some cases owing to the fact that it has enabled the patient to keep the enlarged colon empty by washing it out daily. The following case shows how beneficial this operation may be:

Case.—Mrs. C., aged thirty-eight, was first seen in 1919. At that time she was having the greatest difficulty in getting her bowels relieved, and had an enormous abdomen. A diagnosis of megacolon was made and a laparotomy performed. Practically the whole of the large intestine was involved in the enlargement, and the bowel was tremendously thickened and hypertrophied as well as being large in diameter. There was considerable hypertrophy of all the muscular coats.

Appendicostomy was performed. The patient made a good recovery, and by using the appendicostomy was able to keep herself in good health.

After a few years she allowed the appendicostomy to close, and again experienced serious difficulties. She came back to hospital in 1930 to have the appendicostomy reopened; this was done, she is now keeping in very good health.

Colostomy.—The record of ... ted upon shows ... rtality attending colostomy for this ... very high—hi ... than for any other procedure. Thi ... een cases tre ... omy eleven died. This might to ... ccounted f ... was done only for the relief o ... ere acute

present; but the cases show that, even when colostomy was done where no acute symptoms existed at the time of operation, it often proved fatal. Death occurred in most cases from general peritonitis following the operation, and it was found at the post-mortem examination that the bowel had torn away from the abdominal wall, or leaked. The reason for this is obvious: an artificial anus made into a huge pouch of bowel, such as is usually present in these cases, is a very different thing from an ordinary colostomy operation performed on normal bowel. The dilated loop is large and heavy, and a very serious drag occurs upon the sutures uniting it to the abdominal wall. The result is that the colon usually tears away, and causes general peritonitis from leakage into the peritoneal cavity.

The formation of a spur is, of course, impossible, and if colostomy has to be done, it should be by the lumbar route.

Quite apart from the fatal results which have followed colostomy in these cases, this operation frequently fails to relieve the obstruction. In quite a number of cases the bowels would not act through the colostomy opening.

Resection of the Dilated Colon.—In view of the good results now being obtained by sympathectomy, this operation should no longer be considered for the treatment of megacolon. It has been performed successfully a number of times, but in several of the cases the condition recurred.

CHAPTER XXIV

VOLVULUS

By a volvulus we understand a condition in which some portion of the colon has twisted upon itself or around its mesentery. There are several kinds of volvulus, depending upon the part of the colon involved, and the nature and direction of the twist. It is obvious that volvulus can only occur where the colon has a mesentery sufficiently long to allow the colon to twist. The only part of the colon which normally has a mesentery of any length is the sigmoid flexure, and in a normal individual even this part of the colon is not able to become twisted. It is only when, from some reason or another, the mesocolon has become elongated that a twist becomes possible; but abnormally, other portions of the colon may have a long mesentery, and then may become twisted. Volvulus forms about 4 per cent. of all cases of intestinal obstruction.

From a clinical standpoint we may divide the cases of volvulus into *acute volvulus*, in which the twist forms suddenly and causes complete obstruction and strangulation of the involved gut; and *chronic volvulus*, in which the twist is not complete and does not cause strangulation, though it produces temporary obstruction.

Symptoms—*Acute Volvulus*.—This is the commoner condition, and the symptoms are those of acute intestinal obstruction. They usually commence quite suddenly with abdominal pain and colic. The pain is often severe, and when first seen the patient is frequently doubled up in bed and groaning with the pain, which comes on in spasms. There is usually absolute constipation, but exceptionally there may be straining and tenesmus, with the passage of small liquid stools and mucus. Vomiting is not a marked feature of obstruction from this cause when the pelvic colon only is involved, and not infrequently is absent altogether. The most marked feature of the symptoms is distension of the abdomen. This occurs rapidly, and soon reaches great dimensions. The abdomen is tense, the diaphragm pushed up, and the respiration may be much embarrassed. The abdomen is hyper-resonant. The distension usually is so great that but little can be made out in the abdomen, and it is not possible to locate the trouble to any particular area.

Another characteristic symptom is early and acute tenderness of the abdomen. Collapse, with paleness of the skin and a feeble pulse, occurs after the condition has existed for some time, but it does not appear so

early, nor is it so well marked as in many other forms of intra-abdominal trouble.

In those cases where the cæcum is involved in the volvulus the onset of the symptoms is usually somewhat slower, and vomiting is almost invariably present.

As a rule the pain in volvulus is more or less correctly localized to the area overlying the lesion, and this may be used as a guide in diagnosis. Acute and severe toxæmia is usually present in acute volvulus, and in the later stages the patient presents all the symptoms of acute poisoning from the contents of his own intestine. The progress of the case varies considerably. Occasionally it is very rapid; thus cases have been reported in which a volvulus of the sigmoid became completely gangrenous in thirty hours, and even more rapid cases of gangrene than this have occurred. On the other hand, the symptoms of volvulus may exist for several days, and yet at the operation the volvulus is not found to be gangrenous; the condition, of course, depends on the severity and tightness of the twist.

The diagnosis is often difficult as regards the cause of the obstruction; but volvulus may be suspected when in a case of acute intestinal obstruction we find marked distension and no vomiting. The patients are often elderly, and the condition is very rare in children and young adults. It also appears to be more common in men than in women.

In volvulus of the ileocæcal angle the symptoms may be very acute and death occur early, owing to the large mass of bowel which is strangulated. Thus, in a case described by Burgess death occurred in sixteen hours from the onset of symptoms. The patient was a boy aged eight, in whom the volvulus included the whole of the intestine from the duodenum to the middle of the ascending colon.

The cases in which the cæcal angle is involved may cause great difficulty in diagnosis, and even when the abdomen is opened the complicated arrangement of the parts may render it almost impossible to ascertain what has occurred.

Chronic Volvulus.—There are usually recurring attacks of obstruction, with pain and constipation. In a typical case the patient has repeated attacks of obstruction at varying intervals, which either pass off after a short time or are relieved by the administration of an enema. During the attacks the symptoms are often alarming, the abdomen is distended, the bowels will not act, and there is great pain in the abdomen. The attack, however, passes off, only to recur at some later period. In other cases there are no symptoms of acute obstruction at any time, but the patient has attacks of obstinate constipation lasting for several days, when the bowels refuse to act and there is abdominal discomfort. Between the attacks he may be quite well, though occasionally there is a complaint

of dull pain in the back or in the abdomen. These cases not infrequently culminate in acute and fatal obstruction.

I had one patient, a lady, who had had numerous attacks. The pain came on quite suddenly, and she had discovered that if she lay on her face the attack passed off. No doubt in this position the twist undid itself. At operation there was a large loop of sigmoid, the apex of which reached over to the liver.

In chronic volvulus of the cæcal angle frequent and recurring attacks of slight obstruction, with vomiting and distension, are not uncommon, and in some cases attacks have continued for several years before an acute and serious crisis necessitating operation has occurred. In some cases of chronic or recurring volvulus the symptoms are very obscure.

Ligat distinguished three clinical types of chronic volvulus:

1. When there is severe constipation accompanied by discomfort, but with no crises, or only minor ones.

2. Where there are recurrent attacks of severe pain with constipation and distension.

3. Where there are recurrent attacks of very severe pain with great distension, accompanied by watery or blood-stained diarrhœa. The pain may be severe enough to cause fainting.

In these cases the blood-supply of the affected loop has been interfered with by the twist, and caused acute inflammation of the colon wall.

The best way of making a diagnosis is by means of a barium enema. The patient should first be screened and photographs taken at intervals. Inflation of the colon with air is also of assistance in getting a clear picture of the dilated loop. With care and patience it is generally possible to make a correct diagnosis of recurrent volvulus in these cases if the cause of the symptoms is suspected. As many of these patients suffer for many years, and often end by an acute strangulation, it is very important to detect them, as they are all curable by operation.

It is probable that in many of these the twist only occurs while the patient is in the erect position. Thus patients suffering from this condition sometimes state that they can only pass flatus when lying down, and the author once operated upon a patient who said he was only able to pass flatus by going on his hands and knees. There is often great difficulty in getting the bowels to act, and aperients are frequently useless. Enemas, by distending the bowel and so partly untwisting it, often give relief when aperients will not do so. Many patients with chronic volvulus complain of a dragging pain in the back when standing or walking, and of vague abdominal discomfort. Their symptoms are often indefinite and vague, and as a result are often quite unnecessarily put down to neurasthenia.

The following case is the youngest that I have met with:

Case.—I was asked to see a little girl, aged twelve, who ever since birth had suffered severely from constipation, and who got severe abdominal pain before any action of the bowels. There was also a tendency to distension of the abdomen. On examining the rectum no cause could be discovered. The patient, however, was very tender on pressure on the left side of the pelvis, both from the rectum and from the abdomen. An X-ray photograph showed a very much enlarged and dilated sigmoid colon. I operated on the child and found a large chronic volvulus of the pelvic colon. One could see quite easily the place where the colon twisted upon itself. I shortened the pelvic mesentery with a series of stitches in such a way that the colon could not twist any more, and she was quite cured of all her symptoms.

Etiology—*Predisposing Causes.*—1. Maldevelopment of the peritoneum attaching the bowel to the posterior abdominal wall, or of the mesentery. This is the usual predisposing cause of compound and cæcal volvuli.

2. Alteration in the normal proportions between the length of the mesentery and of its base of attachment. Thus the mesentery may be too long, so that it readily twists about its base of attachment as an axis. The elongation of the mesentery may be congenital or acquired. Or the base of attachment may be too short, which produces a similar condition, and allows the loop to twist around its base. This is a common cause of sigmoid volvulus, the shortening of the base of attachment being due to chronic inflammation of the mesentery.

3. Adhesions or contractions in the mesentery which draw it into a pedicle and allow the distal portion of the loop to twist around the narrowed portion.

4. Adhesions of part of the colon to some other portion of the intestine or to another viscus or structure. This may result in some other part of the colon becoming twisted round the adherent portion as an axis.

The predisposing causes of volvulus may exist for years without causing obstruction, and some further or exciting cause is necessary before serious symptoms occur.

The exciting causes of volvulus are not well known, and are often not evident. Loading of the bowel with fæces and distension with flatus may act as exciting causes by forcing the bowel to assume a fresh position in the abdominal cavity. Sudden strain and external violence often appear to act as exciting causes, though it is difficult to see why.

The best examples of volvulus due to congenital abnormalities of the mesentery occur at the ileocæcal angle.

Elongation of the mesentery is a not uncommon cause of volvulus of the sigmoid. In some instances the mesosigmoid is congenitally too long. More usually the elongation has resulted from overloading of the sigmoid

from constipation of long standing, and consequent stretching of the meso sigmoid from the weight of the loaded loop.

In a case recorded by Bonuzzi the mesosigmoid was four times its normal length, and in one of my own cases it was more than twice its normal length. In Bonuzzi's case complete volvulus had resulted, while in mine a partial volvulus occurred and caused intermittent obstruction. I have been able to find one case of volvulus of the sigmoid in a child two years and four months old. It seems probable that in this patient and in the two mentioned above the elongation of the mesosigmoid was congenital. In volvulus of the cæcal angle the abnormality of the mesentery is always congenital.

Shortening of the base of attachment of the mesentery has been described as congenital; but there is no proof of this, and it seems more probable that it is always acquired. The usual condition is one of cicatricial contraction of the peritoneum from chronic inflammation in the mesosigmoid. Such chronic inflammation is a not uncommon result of constipation. Bands of thickening in the peritoneum can often be demonstrated, or actual adhesions involving the base of the mesosigmoid can be seen.

Tumours in the mesentery may also cause shortening, and cases are recorded of volvulus occurring as the result of a lipoma or sarcoma in the mesentery. Glands which have caseated and subsequently caused a cicatrix are also met with as a cause of volvulus.

In the eastern part of Europe volvulus is much commoner than in England; thus German and Russian surgeons state that cases of this condition form 30 per cent. of the total cases of intestinal obstruction, whereas in this country volvulus only accounts for 4 per cent. of the total. It has been supposed that this greater frequency of volvulus is due to the coarse vegetable diet of the peasants of Poland and Russia.

General Pathology.—Volvulus of the colon is most common in the sigmoid flexure. Thus, out of seventeen cases at the London Hospital, twelve were of the sigmoid flexure and five of the cæcum. Other figures agree closely with this. After the sigmoid flexure the commonest situation for volvulus of the colon is the cæcum or ileocæcal angle, and this can only occur as the result of a congenital abnormality of the peritoneum. The same applies to volvulus of any other portion of the colon; but such conditions are very rare. I have found one case of volvulus of the splenic angle which was operated upon by Littlewood. The volvulus consisted of the splenic flexure, part of the transverse colon, the descending colon, and part of the sigmoid flexure. This portion of the colon had a mesentery 5 inches long. The entire splenic angle had twisted upon itself and caused obstruction of the middle of the transverse colon. Such cases must be very rare, as I have been unable to find another instance. A volvulus of the descending colon is reported by Crisp. The transverse colon is not

uncommonly involved in cases of compound and cæcal volvulus, but it cannot become twisted on itself.

The varieties are very numerous, and the most curious and varied pathological conditions are found. Two distinct pathological types of volvulus or twisting occur:

(*a*) When the twist has occluded the vessels in the pedicle of the loop—that is, when the blood-supply to the affected bowel is arrested.

(*b*) When the blood-supply of the affected loop is still adequate, but the bowel lumen is partly or entirely obstructed.

The affected loop of bowel in condition (*a*) becomes dark in colour, the walls become œdematous, and serum and, later, blood is exuded from the vessels into the lumen of the bowel and also into the peritoneal cavity. This exudation of blood-stained serum is due to rupture of the finer capillaries and to intense congestion. The affected loop also becomes greatly distended with gas, and this is one of the most marked features of volvulus. The distension occurs very rapidly, and reaches great proportions. The gas causing the distension is chiefly carbon dioxide, and arises from the fermentation of the fæcal contents of the bowel. This gas is normally formed in the bowel, but is absorbed and carried away by the blood-stream, and also passed on by peristalsis, almost as fast as it forms. When the blood-stream is arrested and the bowel lumen is at the same time closed, the gas accumulates in the twisted loop and causes the distension.

In experimenting upon cats it was found that distension did not occur unless the venous blood-stream was arrested. If a loop of the colon was thoroughly cleaned out with water before it was twisted, or before the blood-supply was arrested by ligature, distension did not occur, though the phenomena of strangulation did. This proves that the formation of gas is not due to the strangulation, but is simply the result of fermentation of the fæcal contents, and that the distension results from unrestrained fermentation in the affected loop, the gas so formed not being absorbed by the blood or being able to pass into other parts of the bowel. The pathological changes which occur in complete volvulus—condition (*a*)—differ in no important respect from ordinary strangulation, such as occurs in strangulated hernia. The probable reason that distension is more marked in the case of volvulus is that fermentation more readily occurs in the colon. The conditions for bacterial action in the colon are aerobic, while in the greater part of the small intestine they are anaerobic. Gangrene of the bowel ultimately occurs, and general peritonitis may be the cause of death.

In partial volvulus—condition (*b*)—the pathological conditions are the same as in other forms of obstruction of the colon where strangulation is not present. Distension is not a marked feature.

Violent peristalsis occurs above the twist, and a certain amount of distension with fæces and gas in the bowel above. If the partial volvulus is intermittent and lasts for a long time, hypertrophy of the bowel above will take place, as in the case of any other form of partial obstruction.

Volvulus of the Pelvic Colon.—This is the commonest form of volvulus. The predisposing cause in most cases is elongation of the pelvic mesocolon from chronic overloading of this portion of the bowel, as commonly occurs in constipation. Mesosigmoiditis, with contraction and narrowing of the mesentery, is a not uncommon contributory cause. The twist may occur in either direction, but the commonest is the clockwise direction with the rectum behind the upper limb of the loop. The distension of the twisted loop rapidly becomes extreme, and the sigmoid may fill the entire abdominal cavity, and even displace the thoracic organs.

Rupture of the loop rarely occurs, but hæmorrhages into it are common, and after a day or two micro-organisms apparently pass through the bowel wall of the volvulus and cause septic infection of the peritoneum. Volvulus of the sigmoid flexure sometimes occurs in association with congenital dilatation of the colon, but this has already been referred to.

Volvulus of the pelvic colon is usually considered a condition of late life; but I have met with one case in a child aged two years and four months.

Volvulus of the Cæcum and Ascending Colon (Cæcal Angle).—Several varieties of this form of volvulus have been described, but the only difference is in the length of the loop. It can only occur if the cæcum possesses a mesentery, and the parts involved in the volvulus will depend upon the length and attachments of this mesentery.

Several drawings are given of abnormal arrangements of the peritoneum covering the cæcum and ascending colon (Figs. 168 and 169), and it will be seen that any condition may occur between that of a cæcum having a short mesentery, and one in which the cæcum, ascending colon, and part of the transverse colon have a common mesentery with the whole of the small bowel. In the former case the cæcum alone may become twisted upon the termination of the ileum and the commencement of the ascending colon; in the latter, the cæcum, ascending colon, and ileum may become twisted around the transverse colon and jejunum or duodenum. There are examples of both these conditions.

Usually the twist occurs around the ileum as an axis, the heavier and larger portion of the bowel twisting round the smaller and lighter. In another case the cæcum, ascending colon, and transverse colon had twisted round the ileum.

The twist may occur in either direction, but the commonest condition seems to be from left to right. By this I mean in the anti-clockwise direction, the cæcum passing behind the mesentery and from the right to the left side of the abdomen.

In speaking of the development of the colon I mentioned that in the earliest stages the whole alimentary canal possessed only one straight mesentery or peritoneal attachment to the posterior abdominal wall. This primitive condition is found in the three-months fœtus, and also in some of the lower primates (notably *Lemur coronatus*). At first this single mesentery lies vertically in the median line, and the alimentary canal is a single straight tube from one end of the body to the other. Very rapidly, however, the alimentary canal lengthens, and in so doing becomes thrown into folds. At the same time new peritoneal connections or attachments are formed between these folds and the posterior abdominal wall.

The cæcum passes across to the right flank, and later downwards into the right iliac fossa; at the same time it loses its original mesentery and becomes fixed in the right iliac fossa in the condition normally found in man. There do not appear to be many recorded cases in which the early primitive condition has persisted in its entirety—that is to say, where the whole colon shares a common mesentery with the small bowel. But rarely the cæcum, ascending, and part of the transverse colon are found to have a common mesentery with the whole of the small bowel up to the duodenum. The case described and illustrated on p. 419 appears to have been of this nature.

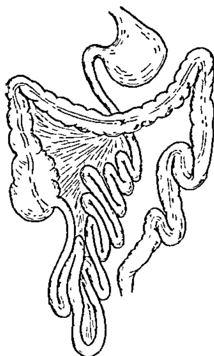


FIG 176—DIAGRAM SHOWING THE CONDITION PRESENT WHEN THERE IS A COMMON MESENTERY TO THE ILEUM AND THE RIGHT SIDE OF THE COLON.
Volvulus is liable to occur, the twist taking place round the point marked X.

It is quite obvious that when this arrangement of the mesentery persists as a congenital abnormality there is always a possibility of the large mass of bowel which is suspended from a single and comparatively narrow mesenteric attachment becoming twisted around its axis and causing a volvulus. That it does not always so result is shown by the fact that this condition of the mesentery is sometimes found post-mortem in elderly patients dying from other diseases.

The pathological condition presented in these cases of volvulus of the cæcal angle is often most complex. As a rule an operation is performed for the relief of intestinal obstruction, and on opening the abdomen the

cæcum is found not to be in its normal position. The position of the cæcum varies considerably; most commonly it is found somewhere on the left side of the abdomen, either below the stomach or over the left kidney: it will depend upon the length of the adventitious cæcal mesentery and upon the extent of the twist.

The most noticeable thing on examining the abdominal cavity is the complete emptiness of the right iliac fossa, and it is this which, as a rule, first draws attention to the nature of the condition. The axis of the twist is usually the small bowel; but the part concerned depends upon the degree of abnormality of the peritoneum present. Thus the ileum may form the axis of rotation, or it may be the jejunum, and in two cases the duodenum formed the axis of the volvulus.

Where the complete condition exists, the twist occurs around the base of attachment of the common mesentery, the duodenum, and the centre of the transverse colon: the actual axis is usually the superior mesenteric artery, which here passes forward between the layers of the mesentery, and which supplies practically the whole area of bowel forming the volvulus. In most cases the rotation is in an anti-clockwise direction (as looked at from below)—*i.e.*, the ileum passes forward and to the right, while the cæcum passes backwards and to the left. The twist very rarely occurs in the opposite direction. A reference to the diagram will at once show why the rotation is usually in the former direction. When the parts are lying in their normal position and no volvulus has occurred, it will be seen that a half-twist in the anti-clockwise direction already exists; so that an accidental half-twist in that direction will cause a volvulus of the entire loop, while a similar half-twist in the opposite direction will simply undo the normal half-twist.

Out of fifty cases collected by Faltin, thirty-five were anti-clockwise and only fifteen clockwise.

In order, therefore, for this condition to occur from a twist in the clockwise direction the loop of bowel would have to twist through a circle and a half, while to produce a volvulus in the opposite direction it will have to rotate through half a circle only. The probabilities, therefore, are much greater of a volvulus being produced in one direction than in the other.

In only two of the thirty cases I have collected was the twist in a clockwise direction. In eighteen of the twenty-nine cases there was a common mesentery to the whole of the ileum, cæcum, ascending colon, and part of the transverse colon. In seven cases the cæcum had a mesentery, and was free to move about. In three the cæcum and ascending colon had a long mesentery.

In one case there was a compound volvulus resulting in a most complicated condition The sigmoid flexure was twisted round the ileum,

cæcum, and ascending colon from left to right. One would suppose that this form of volvulus, owing to its congenital origin, would occur most frequently in children and infants, but this is apparently not so. Most of the cases are in adults, and the condition is most frequent between the ages of twenty and forty.

The following table shows the age incidence in thirty cases. There were three cases in infants, the youngest being four days old, while the oldest patient was seventy-two.

	Cases.
Under 5 years of age	3
Between 5 and 20	6
Between 20 and 40	11
Between 40 and 60	7
Over 60	3

The average age was 36.

If there is a common mesentery to the ascending colon, cæcum, and small bowel, the condition of the patient when volvulus occurs is a very serious one, owing to the great length of the bowel involved in the twist.

Volvulus of the cæcal angle occurs either as an acute condition, in which case it is almost always fatal, or in a chronic form. If the condition can be detected before acute strangulation has taken place, the condition can be rectified. I have on three occasions operated for chronic volvulus of the cæcal angle, and the results have been excellent. The following case is sufficiently remarkable to be worth recording:

Case.—A girl, aged eighteen, was sent to me with a history of having had three attacks of pain in the abdomen. Each attack had lasted for several days and was quite severe. She had no vomiting or other symptoms. The attacks came on quite suddenly without any apparent reason. During the attacks her doctor noticed in the middle of the abdomen a large, firm swelling, which disappeared after the attacks had subsided. No swelling could be felt except during the attacks.

Examination with a barium meal showed a remarkable condition. The stomach was pushed up to the left, and when the meal passed into the colon it was seen to go straight down the middle of the abdomen; no colon was to be seen on the right flank at all. A barium enema showed that the colon after forming a loop in the pelvic portion passed straight up to the splenic angle and then back again to the bottom of the pelvis. There were no signs of any cæcum, ascending colon, or transverse colon (Fig. 177).

The case was evidently one of a primitive state of the colon in which the cæcum had never moved over to the right side, and had retained its central mesentery as in the early stages of development. The mesentery of the right side of the colon was common to that of the whole small intestine, and the whole of the cæcal angle was completely loose. I concluded that the attacks were due to a twist of the cæcal

angle, and in view of the great danger of a volvulus occurring advised operation.

The abdomen was opened by an oblique incision on the right side. The cæcum lay in the bottom of the pelvis, and from there the colon passed straight to the splenic angle, having a mesentery common to the whole of the small gut. There was quite a band of lymph and inflamma-



FIG. 177.—SKIAGRAM OF COLON WITH BARIUM ENEMA.

tion passing right round the cæcal angle and small gut at the point where a partial twist had occurred, but no twist was present at the time of the operation. A large flap of the posterior peritoneum was raised, passing over the lower pole of the kidney, and carried down to the brim of the pelvis with its base outward towards the flank until it exposed the right ureter and the main vessels (Fig. 178). The cæcum and part of the vertical colon were then displaced to the right side behind the flap, and

the front edge of the flap was carefully sewn to the anterior muscle band of the colon all the way along. The edge of the peritoneum on the inner side was then brought up and stitched in a similar manner to the inner edge of the colon. This was carefully fitted round the ileocæcal junction to prevent any strangulation at this point. The abdominal wound was then closed.

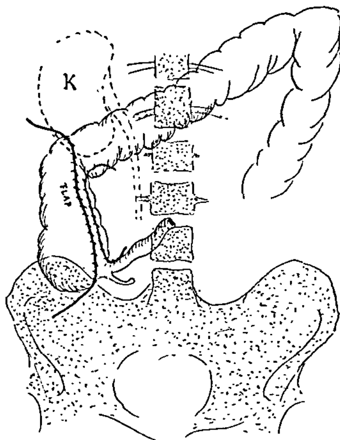


FIG. 178.—FIXATION OF FLOATING CÆCUM.

The patient made an uneventful recovery, and the bowels acted smoothly from the beginning. Skiagrams taken since the operation show the cæcum in its normal position and apparently firmly fixed (Fig. 179).

Compound Volvulus.—Many of the cases of cæcal volvulus in which the ileum, cæcum, and ascending colon were involved have been described as compound. But if the term is to be retained, it should be reserved for cases in which either two separate and distinct twists have taken place in different portions of the bowel, as, for instance, where there is a volvulus in the small bowel and another in the sigmoid, or where a portion of the small intestine has become twisted round the sigmoid flexure, or *vice versa*.

Karl Richter has recorded three cases in which there was a volvulus of the small intestine and another of the pelvic colon. The small intestine may become twisted round the sigmoid flexure, but more commonly the former acts as the axis, and the sigmoid is twisted round it. Leichenstein collected twenty-one cases of this form of compound volvulus. In twelve the loop of small intestine formed the axis, and the sigmoid was twisted



FIG. 179.—THREE WEEKS AFTER FIXATION OF CÆCUM.
(Compare with Fig. 177.)

round it from left to right and from before backwards. In the remaining cases the twist was in the opposite direction.

Symptoms.—The symptoms of volvulus of the cæcal angle are very acute. They are those of strangulation of the gut, and resemble strangulation by bands or hernia; but the symptoms come on very rapidly, accompanied by severe fæcal vomiting and by tremendous dilatation of the abdomen. When the strangulation is complete considerable bleeding into

the bowel may occur, and blood may also be found free in the peritoneal cavity. It is very unlikely that an exact diagnosis will be made, but symptoms pointing to the immediate necessity of an exploratory laparotomy will not be wanting.

Treatment.—In cases of acute or complete volvulus, immediate operation affords the only hope of saving the patient's life, and much of the success of the operation depends upon its being performed as soon as possible after the occurrence of the twist. Volvulus cannot always be diagnosed apart from operation, but we can always diagnose the presence of acute obstruction, and this is sufficient indication for immediate operation.

Very occasionally an enema administered in the knee-elbow position will result in the volvulus untwisting itself, with immediate relief of the obstruction. I have once seen this occur, and it is worth trying. If successful, the patient should later on be operated upon to prevent a recurrence of the condition.

The abdomen must be opened and the distended loop pulled out. Although it is excellent practice when operating upon the abdominal viscera not to expose the gut more than is absolutely necessary—and this is particularly advisable in acute cases—at the same time, directly a volvulus has been detected it is useless to attempt to deal with it inside the abdominal cavity through a small incision. A free opening should be made and the entire involved loop pulled out. This is more especially necessary in dealing with volvulus of the cæcal angle, or compound volvulus, for these are so complicated that, if a big incision is not made and the whole mass brought out, it is more than probable the reduction of the twist will be incomplete.

The distended loop or loops, having been delivered, must next be unravelled, and the colon carefully examined to make certain that the obstruction has been completely removed. If the volvulus has only existed a few hours, it will probably be safe to return it and close the abdomen. If, however, there is much distension, or if it has existed for more than a few hours, the coil must be emptied of its contents and drained by establishing an artificial anus. This is rendered necessary by the fact that the twisted coil almost certainly contains highly virulent pathogenic organisms and toxins, and its walls are allowing these to pass into the circulation, and also into the peritoneal cavity. The bowel is, moreover, at any rate temporarily, paralyzed; if it is simply untwisted and returned, many of the patients will die within the next forty-eight hours from intense toxæmia or peritonitis. If possible the distended loop should be washed out, and a Paul's tube tied into it to allow of the contents draining freely away.

Nothing more can be done at the first operation; but if the patient

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Nothing more can be done at the first operation; but if the patient

recovers, the advisability of performing another operation to prevent recurrence should be considered, because the predisposing cause of the volvulus is still present, and a recurrence is very probable if nothing further is attempted.

It is obvious that in cases of volvulus of the cæcal angle, where a large mass of gut is involved, pulling out the whole of the twisted loop is a most serious procedure, which is more than likely to prove fatal from shock, or to result in the bursting of some part of the damaged bowel. As a matter of fact, very few cases have been known to survive complete volvulus of the cæcal angle. To attempt to untwist the loop within the abdomen would seem to be useless, but I was fortunate enough to achieve this on one occasion.

Case.—The patient was a man of fifty-nine, who suddenly developed symptoms of acute obstruction of the colon, with great distension of the abdomen. He was in such a bad condition that it seemed doubtful if he could survive any operation. On opening the abdomen the cæcum was seen to be in the left kidney pouch, and a diagnosis of complete volvulus of the cæcal angle was obvious. Evisceration seemed the only possibility of undoing the twist, but it was almost certain that such a procedure would be fatal immediately. I decided to gamble on the twist being in the commonest direction—namely, anti-clockwise. I then passed my hand into the abdomen and caught hold of the cæcum in the left kidney pouch, and pushed it behind the mass of gut towards the right side. This proved to be correct, and the whole twist came undone, as was evident at once from the contained gas moving on into the collapsed colon below. Unfortunately, before the wound could be closed a piece of damaged small intestine gave way and flooded the wound. The tear was sewn up and the abdominal wound closed. After a very stormy period the patient made a complete recovery and is still alive.

Excision is a formidable operation in such cases as these, as the patient is dangerously ill already, and a considerable length of bowel will have to be removed. In some cases it would be impossible, since it would involve removal of the greater part or even the whole of the small bowel.

A case has been recorded in which the twisted loop was gangrenous and 80 cms. of bowel were resected, the patient recovering. This case is a remarkable one, and shows that excision is justifiable, even when dealing with such a severe lesion as a gangrenous volvulus of the cæcal angle of the colon. A similar case of recovery after excision of a cæcal volvulus in a young woman has been recorded by Wrigley and Moritz.

Enterostomy or drainage of the twisted loop is useless in the case of a large volvulus of the cæcal angle, and all the recorded cases so treated appear to have ended fatally.

Methods of Preventing Recurrence.—Various operations have been dvised in order to prevent a recurrence of the volvulus.

Shortening of the mesosigmoid is sometimes successful, but the best method of preventing recurrence, and probably the only certain one, is excision of the sigmoid loop. I have performed resection of the loop with end-to-end union on several occasions to cure a chronic volvulus, though, of course, this is only possible when there is no obstruction, and must not be entertained when dealing with an acute case. This is, however, a somewhat serious operation, and a good result may often be obtained by measures involving less risk. Since the condition is in most cases due to a deformity of the mesentery, the indication is to correct this, and the procedure which has most to recommend it is to shorten the mesocolon by means of suitably placed sutures.

It is difficult to trace cases of volvulus in order to ascertain if recurrence has occurred in those cases where the bowel has simply been untwisted; most writers, however, agree that it is common, and I have been able to find several cases in which the after-history showed recurrence to have taken place.

One patient, a man aged twenty-one, had a volvulus of the sigmoid. This was untwisted and colostomy performed. He recovered, and the colostomy opening closed. Two years later he again got a volvulus of the sigmoid flexure; on this occasion the sigmoid was resected, and he remained well.

In another case, that of a man aged sixty-three with volvulus of the sigmoid, the volvulus was untwisted and the colon fixed by forming an artificial anus. The patient recovered, and the opening was allowed to close. A year later the volvulus recurred, and at the operation the adhesions were found to have entirely disappeared. The sigmoid was again untwisted. Eleven months later he had for the third time to be operated upon for a volvulus of the sigmoid.

Operation for Shortening the Mesocolon.—The loop of bowel forming the volvulus is drawn out of the abdominal wound, and held towards the inner side of the wound by an assistant, so as to put the mesocolon slightly on the stretch. A row of Lembert sutures are then inserted, taking up the peritoneum only, right across the mesocolon to within a short distance of the bowel on each side. These sutures should be inserted on the outer or iliac side of the mesocolon, and when inserting them care should be taken to avoid injuring any bloodvessels. When this row of sutures is tied, it should form a pleat in the mesocolon. A second similar row of sutures is then inserted over the first, so as to shorten still further the mesentery, and if necessary a third row. After the sutures have been inserted it will be found that a kink has been formed in the colon at either end of the suture line. To get rid of this a few more Lembert sutures should be inserted parallel to the bowel wall and opposite any such kink (see Fig. 180). If the sutures are properly placed the kink can be straightened out. It

is, of course, necessary to see that the blood-supply of the loop has not been interfered with by the suturing, but if the stitches have been carefully placed there should be no difficulty.

In one patient on whom I performed this operation the mesocolon was over 8 inches long, and was reduced to 3½ inches by the suturing. Previous to operation he had suffered severely from constipation, and could

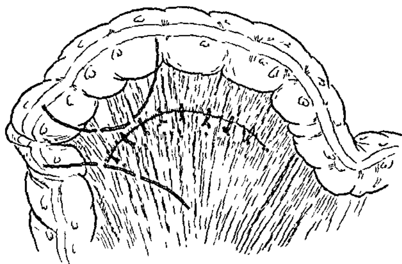


FIG 180.—DIAGRAM SHOWING METHOD OF SHORTENING THE MESOCOLON BY LEMBERT SUTURES

The stitches pass through the outer peritoneum only, so as not to constrict the vessels. The method of passing additional sutures in order to remove a kink is also shown.

only relieve his bowels by means of large enemata. Afterwards the bowels acted normally, and the result was excellent.

Treatment when the Colon is Gangrenous.—If the volvulus is found to be gangrenous, excision is the only remedy, and the best chance of recovery will be secured by tying a Paul's tube into each end of the colon after resection and bringing the ends out.

CHAPTER XXV

ADHESIONS AND KINKING

Adhesions of the Colon.

Cases in which there are adhesions involving the colon are of considerable interest, for this condition is a not uncommon cause of severe constipation and abdominal pain, and occasionally of acute obstruction. The condition commonly results in a severe degree of chronic invalidism, and as such merits close attention.

In some patients there are only a few adhesions, fixing or kinking the colon at one place, while in others the adhesions are extensive and general, involving the whole or a great part of the large bowel, and often the small intestine as well.

Where there is only a single band of adhesions, the condition is usually the result of some local inflammatory lesion, such as an ulcer of the colon, inflamed glands, etc.; but where they are extensive it has arisen from a general peritonitis or from some previous operation or injury. Cases are met with, however, where no satisfactory explanation of the presence of adhesions can be found.

Baisch conducted some experiments upon animals to ascertain the cause of the formation of adhesions after operation. He did two series of experiments, in both of which similar peritoneal lesions were produced. In one series, complete hæmostasis was secured; in the other, varying quantities of blood were allowed to remain in the abdominal cavity. In the first series no adhesions developed, while in the second they were constantly present when the animals were killed.

When a patient recovers from general peritonitis, extensive adhesions between the different parts of the bowel and between these and the abdominal walls are undoubtedly left; but there is abundant evidence to show that in course of time these may entirely disappear. Numerous cases have been recorded where the abdominal cavity has been subsequently opened either at an operation or post-mortem (the patient having previously suffered from general septic peritonitis), and no trace of adhesions has been found. In some cases, however, the adhesions do remain after recovery from general peritonitis, and may cause serious consequences.

Why adhesions should remain in some cases and not in others cannot be explained until we know much more than at present as to the exact

physiological processes which occur in the abdomen during recovery from peritonitis.

Some of the worst cases of general adhesions are those in which the condition has followed an operation upon the abdomen, and in which, apparently, the wound remained aseptic. Here it is probable that the result is due to blood having been left in the abdominal cavity. Extensive adhesions involving the transverse colon may result from a gastric or duodenal ulcer which has leaked and produced a localized abscess outside the stomach. These cases often have a history of abdominal pain over long periods, but have never had sufficiently severe symptoms to warrant a diagnosis of perforated ulcer. I have on several occasions, when operating for chronic obstruction of the colon, found very extensive adhesions involving the transverse colon, which could only have resulted from a leaking gastric or duodenal ulcer. Such adhesions are very difficult to deal with, and are sometimes so dense as to forbid any attempt to separate them.

Very extensive adhesions are sometimes met with as the result of previous peritonitis, and such cases are most difficult to deal with. Operations for dividing the adhesions and freeing the intestine are more often than not failures. While one lot of adhesions are freed, fresh ones are formed, so that the unfortunate patient too often goes from bad to worse. Where there are serious symptoms of chronic obstruction, or where an acute obstruction is threatened, it is obvious that something must be done. All raw areas uncovered by normal peritoneum should be most carefully repaired by careful suturing with fine gut, and the most careful hæmostasis must be observed.

The worst cases are those where the adhesions have resulted from tubercular peritonitis in infancy. The adhesions are often so extensive that the peritoneal cavity is almost or entirely obliterated. On dividing the abdominal wall no cavity can be found, and all the intestines are so matted and stuck together that it is almost impossible to find the actual obstruction. The adhesions cannot be freed, and it is usually impossible to do anything. It is an extraordinary fact that persons can live for years with little, if any, trouble from such a condition, though many of them get obstruction in the end. The difficulties of dealing with such cases when acute obstruction has supervened are almost insurmountable.

There is no doubt that very extensive adhesions may exist without the patient having any symptoms until by some unfortunate accident a piece of bowel gets kinked or twisted.

At one time considerable importance was given to so-called pericolonic membranes, or, as they are sometimes called, Jackson's membranes. These membranes are thin peritoneal sheets or bands covering over portions of the colon, or in some cases passing from one coil to another. J. R.

Eastman, who has made a special study of these curious membranes, classified them as follows:

1. Membranes which represent exaggerations of normal anatomical fusions, folds, or ligaments.
2. Membranes which correspond in form and position to anomalous peritoneal fusions.
3. Membranes occurring anywhere, and which appear to be of inflammatory origin.

These membranes have not often been observed in children, which one would expect if they are of fœtal origin. This may, however, be due to their being overlooked. Keith stated that they are not infrequently present in the fœtus, and he attributes them to intra-uterine inflammatory changes.

I think we may assume that they are generally of fœtal origin, but that they may result from inflammatory conditions in later life.

It is very doubtful if Jackson's membranes are pathological in the sense that they cause symptoms, except in a few exceptional cases. In the vast majority of instances in which they are met with they should be considered as anomalies of no pathological importance. Jackson's original description of this membrane, which is sometimes found on the right side of the colon, is as follows:

" From a point at the level of the hepatic flexure to 3 inches above the caput coli there spread from the parietal peritoneum over the lateral margin and front of the colon to its medial longitudinal muscular band a thin vascular veil, in which long, straight, unbranching bloodvessels coursed."

These membranes are not infrequently met with, but Jackson was the first person, I think, to suggest that they were the cause of symptoms. They have been attributed to inflammatory processes in association with the colon, but there are very strong grounds for believing that they are congenital in origin. Morley, in a careful investigation of several cases, pointed out the noteworthy fact that most of the cases in which the membrane is present show persistence of the ascending mesocolon, with the usual abnormal mobility of the cæcum and colon. In other words, they are associated with obvious congenital abnormalities of this portion of the colon. Morley investigated the condition in the chimpanzee, and he found that in this animal the great omentum extended to the right across the front of the hepatic flexure, to which it was fused. His observations led him to conclude that the great omentum originally extended much further to the right than is now the case, and that Jackson's membrane, when present, is probably a relic of this part of the great omentum.

The importance at one time attached by some surgeons to the presence

of this membrane was probably quite unwarranted. While the possibility that Jackson's membrane may occasionally cause trouble by kinking the bowel, or by acting as a band or pocket to cause strangulation, cannot be denied, there is very little evidence of cases in which it is the cause of trouble. As a rule, these membranes are found accidentally in the course of an exploratory laparotomy, and need not be looked upon as mischievous. There is very little evidence of their producing symptoms; they are merely an unusual arrangement of the peritoneal attachment on the right side of the colon.

Lane's Kink.—This consists in a fixation of the ordinary mobile portion of the ileum, just before it reaches the cæcum, by a band of adventitious peritoneum. It is probably on the same lines as Jackson's membrane, and is a congenital abnormality of the arrangement of the peritoneum in this neighbourhood. Evidence in favour of its being the cause of stasis or other abnormality of function in the alimentary canal is not supported by any weight of evidence.

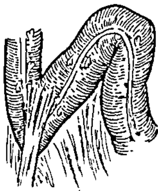


Fig. 181.—Kinking of Pelvic Colon from a Band of Adhesions.

Symptoms.—The symptoms produced by adhesions of the colon are numerous and varied. The most common are abdominal pain and discomfort, and chronic difficulty in getting the bowels to act.

The pain is often of a most indefinite character, and, although seldom severe, is usually more or less constant. It is worse when standing or walking, and is relieved by lying down. The patient often refers the pain to one or more definite spots on the abdominal wall, but these do not necessarily correspond to the situation of the lesion. The pain may be described as a chronic dragging pain, or as a dull colicky pain; it may be referred to the spine or sacral region. In some cases there is no actual pain, but a constant sense of discomfort in the abdomen, only relieved by lying down. Chronic constipation of a severe character is almost always present. The bowels only act as the result of using aperients or enemata, and even then often not satisfactorily or intermittently.

Many sufferers from this condition become markedly neurotic, and it is a common cause of chronic invalidism.

In some cases there are recurring attacks of partial obstruction, with severe abdominal colic, and sometimes vomiting. After the administration of aperients and enemata the attack terminates with an action of the bowels, but is followed in the course of a few weeks by another.

Many of the patients suffer from chronic colitis, and pass large quantities of mucus in the stools.

Walking or any form of exercise increases the pain and discomfort; consequently, the patient gets no exercise, and often not enough fresh air; as a result, anæmia often supervenes.

The symptoms may persist for years, the patient occasionally getting temporary relief as the result of some new treatment, only to relapse again in the course of a few weeks or months.

If the adhesions are in the pelvic region there may be pain on micturition. If about the colon, they may cause pain by being dragged upon or stretched, or chronic obstructive symptoms, owing to their preventing free movement of the bowel and giving rise to sharp corners and angles.

Chronic Obstruction from Angulation or Kinking of the Colon.

In these cases there is an acute angle, kink, or twist in some portion of the colon, usually in the sigmoid flexure, which, though it does not entirely block the bowel lumen, constricts it to such an extent as to cause chronic obstruction to the passage of the intestinal contents, or causes the frequent impaction of solid fæcal material at this point, with consequent recurring attacks of more or less complete obstruction.

If is, of course, understood that a kink is of no importance unless fixed by adhesions so that it is permanent. The whole of the intestinal canal is normally kinked in some part or another, and could not be packed into the abdominal cavity otherwise; but if the kink is fixed by adhesions so that it cannot come out when the contents of the bowel is passing, it becomes abnormal.

One of the commonest situations for kinking to occur is at the junction of the mobile pelvic colon with the fixed upper end of the rectum. The apex of the pelvic loop is also a not uncommon situation.

The condition may result from any of the following causes:

1. Contractions or adhesions in the mesosigmoid from inflammation.
2. Adhesions between two adjacent portions of the pelvic colon, or between this and some other structure.
3. Abnormal length of the mesosigmoid.
4. Recurring volvulus.

Any inflammatory process which results in the formation of a local cicatrix or contraction in the mesosigmoid may result in the formation of an acute kink or angle in the pelvic colon. Such a condition may arise from a caseating tuberculous gland in the base of the mesentery, from a diverticulum, from an abscess behind the peritoneum, and from such a condition as perimetritis.

I have operated in a number of cases in which the kink was found to be due to a broad band of peritoneal adhesion between the pelvic colon and the left iliac fossa. The peritoneal band formed part of the mesentery on the outer side, and was not separated from it. It was shorter than the

mesentery itself, and in consequence an acute and abnormal angle or flexure was produced in the centre of the pelvic colon. In each of these cases the patient for several years had had difficulty in getting the bowels to act properly. In one case there had for some years been frequent and severe attacks of pain and obstruction, and in two others there was a history of severe and intractable constipation for several years. In none of them was any definite cause found for the formation of the band.

One of the commonest causes is undoubtedly chronic ulceration of the pelvic colon and pericolitis, with the consequent formation of adhesions between the peritoneum covering the base of the ulcer and some adjacent structure, the subsequent contraction of the adhesions producing a kink. Or two contiguous portions of the pelvic colon may become stuck together, with the result that an acute angle is formed at the apex of the loop.



FIG 182.—DIAGRAM TO SHOW DIFFERENT WAYS IN WHICH ADHESIONS MAY PRODUCE A KINK OR OBSTRUCTION.

A, Two appendices epiploicæ adherent to one another, B, the two sides of a loop adherent to one another, C, a double kink caused by a band of adhesions.

Chronic diverticulitis is a very common cause of kinking of the colon, giving rise to obstruction.

In quite a number of the cases appendicitis has been the cause. The sigmoid flexure has become adherent to the appendix or cæcum on the right side of the pelvis, and the weight of the proximal loop of the pelvic colon has resulted in an acute angle being formed at the point of the adherence on the right side, while in a few instances the appendix is found stretching across the pelvis, adherent at its tip to the sigmoid, and kinking it.

The condition may result from extensive pelvic adhesions following general or pelvic peritonitis. This is well known, and numerous instances have been met with. In such cases the pelvic colon may be bent into several acute angles and much contorted, so that it is surprising that the fæcal contents are able to pass along it at all.

In one case two acute angles in the pelvic colon had arisen from extensive adhesions between the sigmoid and the vertebral column, the result

of general peritonitis. Adhesions between the ovary or tubes and the sigmoid may cause a kink in a similar manner.

One would expect that dilatation and hypertrophy of the bowel above the obstruction would occur; this is so, but not to any marked degree. In one case the bowel was ulcerated both above and below the constricted point, but it was doubtful if this was true stercoral ulceration. In several others attacks of diarrhœa would seem to indicate inflammation above the stricture. Fæcal impaction and the formation of stercoral calculi in the colon above the constricting angle have been present in several instances. The bowels will not act in these circumstances without the use of strong aperients, often aided by enemata administered with a long tube.

It is difficult to believe that under any circumstances a kink can by itself produce obstruction of the colon, and it seems more probable that in these cases the real cause of the obstruction has been a temporary volvulus of some portion of the large bowel.

Favel reports a case in which a long mesentery to the cæcum and ascending colon was associated with severe pain in the abdomen. The patient was a woman, aged thirty-two, who had suffered from several severe attacks of pain thought to be due to appendicitis. The appendix was removed, and found on microscopic examination to be ulcerated, but there was no relief from the pain. A second operation revealed the fact that there was a long mesentery to the cæcum and ascending colon, with a band of adhesions fixing the ascending colon to the abdominal wall. The whole cæcal angle tended to revolve around this band and become twisted. The band was divided and the outer wall of the cæcum anchored by sutures to the iliac fossa. This cured the patient.

Unless angulation is suspected and carefully sought for it may easily be overlooked, even at an operation, when the abdomen is explored. The kink often occurs only when the patient is standing, and the force of gravity can pull down the pelvic colon into the pelvis. When the patient is recumbent, as he naturally will be during the operation, no kink may be seen. The condition, however, will not easily be missed if the pelvic colon is carefully examined for the presence of adhesions, the length of its mesentery, and the facility with which it can be kinked at its fixed ends.

Obstruction may result from a portion of the omentum being caught in a hernial sac, or in an operation scar, in such a way as to kink the transverse colon and obstruct the lumen. I once saw a case where a patient died from acute obstruction due to this cause; he was suffering from cancer of the rectum, and a left inguinal colostomy had been performed. The colostomy opening did not act, and five days after the operation the patient had developed all the symptoms of intestinal obstruction. On opening the abdomen it was discovered that a piece of the great omentum had been taken up in the spur stitch in performing the colostomy; this

had caused an acute angle in the centre of the transverse colon, which had completely blocked the lumen. Clark recorded a similar case, in which acute obstruction resulted from the omentum becoming adherent in a left inguinal hernia. The patient was successfully operated upon.

Adhesions between the gall-bladder and the hepatic flexure of the colon may cause obstruction. I have several times seen severe chronic obstruction from adhesions of the hepatic angle of the colon, due to old disease of the gall-bladder. Several cases have been recorded where a large gall-stone has ulcerated into the colon and been passed per anum.

Treatment—*Non-Operative Treatment.*—While much can be done by non-operative methods to prevent the formation of adhesions after operations or an attack of peritonitis, they often fail when the condition has once become well established. When abdominal pain and discomfort are the chief symptoms complained of, a thorough trial should be given to non-operative methods before proceeding to perform laparotomy. In those cases where there are recurring attacks of obstruction palliative measures seldom do any good, and operation is often the only method of relieving the symptoms.

It is usually impossible to tell how much benefit will result from careful medical treatment, and it is therefore always advisable, unless serious symptoms are threatening, to try the effect of massage and exercises before proceeding to perform laparotomy.

Much can often be done by properly applied massage. For this to be effective, however, it must be well done, and combined with other forms of treatment. Too often the patient is told that he is to have massage, and is allowed to continue his usual mode of life, and the masseur simply comes in for half an hour a few times a week. In these days also, when almost every nurse considers herself a skilled masseuse, sufficient care is not taken to see that really skilled massage is being given. Such treatment is generally useless. A really skilled masseuse is essential, and abdominal massage should be commenced gently. At first the patient should be massaged for not more than ten minutes twice a day. This is much better than for twenty minutes once a day, and it will not cause so much fatigue.

When possible, the massage should be combined with electrical treatment. The sinusoidal current applied to the abdomen appears to be the most useful. The instrument should be capable of giving a quick break, and the current should be applied for about ten minutes at a time. High-frequency currents also seem to do good in some cases, but it is essential that the apparatus should be a good one, and not one of the toys so often seen in so-called electrical institutes.

The electrical application should be given first, and should be followed

by massage. As the patient grows accustomed to the treatment the period may be extended, but fifteen minutes' massage is usually sufficient, except in patients with very rigid abdominal walls. After the first week, exercises against resistance should follow the massage. These exercises should be those which contract the abdominal muscle and which flex the spine and thigh. Such exercises do good by moving the parietal peritoneum through the agency of the muscles in contact with it.

Treatment should be continuous at first, and the shortest time for a course which will do any real good is from a month to six weeks. During this period the patient should not be kept in bed, except, perhaps, during the first few days, but should be got out daily for a short time. After a course of treatment the patient should be instructed to take regular exercise, and to keep the bowels acting daily. The best forms of exercise are probably walking and riding. If marked improvement follows, the patient should have a second and shorter course of massage and electricity in about two months' time.

In many cases, although some improvement follows a thorough course of massage, the patient soon relapses to the old condition, and in the worst cases little, if any, improvement occurs. Where a definite obstruction from kinking has occurred, nothing short of operation will do any good. Operation is indicated when there is serious difficulty in getting the bowels to act, and also when the patient is so greatly incapacitated by his symptoms as to prevent his attending to the ordinary affairs of life.

Operative Treatment.—The operation consists in separating or dividing adhesions and re-establishing the normal course of the bowel. Where only a few adhesions or a single band are present this may be an easy matter, but in other cases it may prove most difficult, on account of the density and closeness of the adhesions.

I once operated upon a woman, aged forty-eight, who had had three attacks of acute obstruction, from which she had recovered with difficulty. On opening the abdomen a cord-like band of adhesion some 4 to 5 inches long was found stretching from the middle of the great omentum to a point near the umbilicus in the abdominal wall. Apparently the bowel became strangulated around this cord. It was cut away, and no further symptoms of strangulation occurred.

On another occasion I was asked to see an elderly lady, aged seventy-three, who had been having symptoms pointing to obstruction. On opening the abdomen a number of dilated coils of small intestine were discovered, which were partially strangulated around a band of adhesions passing from the lower edge of the omentum to the anterior abdominal wall in the right iliac region.

When the adhesions are very firm, or serious difficulty is experienced in straightening the bowel, the best procedure is probably to resect the

involved loop and unite the ends of the bowel, if this can be done, or short-circuit the obstructing angle by lateral anastomosis.

It is not, however, sufficient merely to divide the adhesions in any ca since, if raw surfaces uncovered by peritoneum are left, the adhesions a almost certain to reform and re-establish the original condition. T prevention of subsequent adhesions constitutes the chief difficulty in th cases. Various methods have been advocated by different surgeons, a various substances have been used to cover the raw surfaces with t object of preventing the formation of adhesions. Thus, painting ov with gum or glucose has been tried. Covering them with gold leaf h been done a good deal, and with apparently good results. Filling t abdomen with salt solution and subsequently giving large rectal or su cutaneous injections of water or salt solution has been depended up by some surgeons, while others again believe in abdominal massa applied to the abdomen for some time after operation.

None of these methods have been entirely successful in preventing th re-formation of adhesions, and there are numerous instances in whi adhesions have reformed after repeated operations.

Undoubtedly the best method is to bring the peritoneum careful together, so as to cover all the raw surfaces left by division of the adhesion This involves some form of plastic operation, and considerable care an patience. It is often possible, after dividing a peritoneal band transversel to stitch the resulting wound in the peritoneum in a longitudinal directio so as completely to cover in the raw surface, and at the same time straighte the bowel.

By similar means, and by utilizing loose folds of peritoneum, appendice epiploicæ, or omentum to cover in defects in the peritoneum, much ma be done to prevent the recurrence of adhesions. Absolute asepticity an great care in removing all blood-clot from the peritoneal cavity are, how ever, the most important factors in preventing their formation; and a subsequent course of massage is advisable.

The actual details of operation must vary with every case.

Many of the operations which aim at relieving obstructive angulation of the colon or chronic volvulus by fixation of the bowel with sutures fai to cure the condition. The patient is usually much improved, or ap parently cured, immediately after the operation; but some months late the old condition comes back, and the constipation and chronic obstruc tion are soon as bad as ever.

CHAPTER XXVI

CHRONIC CONSTIPATION

CONSTIPATION results from the intestinal contents being unduly delayed in their passage along the alimentary canal. This may occur in any part of it, but is most commonly found in the large bowel, and may result from a great variety of causes. It is not possible in these days to consider constipation as a distinct malady, and the first essential always is to ascertain the cause for the condition. Chronic constipation, like many other complaints of the present day, is in most cases a result of modern civilized life. Among native races and wild animals it is practically unknown, but is all too common in civilized communities, and, indeed, forms one of the most frequent disorders of our great cities. Modern methods of dietary and the sedentary character of our daily life are largely responsible for the tendency to constipation which is so prevalent. It is one of the penalties we pay for the comparatively small use we make of our colons.

Quite apart from this there is, I think, no doubt that the large bowel in man has been put at a serious disadvantage by the adoption of the erect attitude. In animals the position of the colon under normal conditions is in the horizontal plane, while in man during most of the day it is in the vertical plane. As its contents are more or less solid, the colon works at a serious disadvantage as compared with what is the case in animals. This is to a very large extent compensated for by the more muscular abdominal wall of man. Man's intra-abdominal pressure is much higher than in most animals, and it is this which enables his colon to pass along its contents, in spite of the fact that it is apparently working against the power of gravity.

It follows from this that one of the primary causes of stasis is weakness of the abdominal wall, a conclusion to which most observers have come. Glenard of Vichy was one of the first to point out that the integrity of the abdominal wall was the key to the enteroptosis which frequently accompanies stasis in the colon.

One of the chief functions of the colon is that of preserving and conserving the fluid contents of the body by the extraction of the excess of moisture from the contents of the alimentary canal. This is now no longer a necessity of life under civilized conditions, and this function of the colon is not required under the conditions in which most of us live.

Hurst's researches, in which patients with severe constipation were

examined by the X rays after a bismuth meal, have clearly proved that in most severe chronic cases the delay occurs in the lower part of the colon, and chiefly in the sigmoid flexure. This is the natural receptacle for the fæces previous to dejection. The rectum, being purely an expelling organ, is empty in normal individuals, except just previous to and during the act of defæcation. Occasionally, constipation may result from the rectum not acting properly, as in chronic nerve lesions of the spinal cord, but this is comparatively rare.

Being only a symptom, constipation can have no distinctive pathology, and its causes form a large part of the subject matter of this book, and will be found scattered throughout its pages.

It is obvious that there are two distinct kinds of constipation:

1. That in which the peristaltic power of the colon is normal, but the passage of fæcal material is delayed by the presence of some obstruction in the bowel; and

2. That in which there is no obstruction, but the peristaltic and expulsive power is deficient.

The first is often called obstructive and the second atonic constipation.

There is a third factor, which is often important, though it is not by itself a frequent cause of constipation. This is the consistency of the fæcal material.

The longer fæcal material is delayed in its passage along the colon the harder will it become, owing to the extraction of water by the bowel walls; and the harder it becomes the less easily will it be passed along by peristalsis, so that a vicious circle is soon established. The consistency of the fæces, therefore, is often an important factor both in obstructive and atonic constipation. An individual should not be considered as suffering from constipation simply because there is not an action of the bowels daily. Many persons only have such an action three or four times a week, and yet remain in perfect health; while others again have a normal action twice daily. Constipation is only present when the bowels act with no regularity, or only as the result of aperients.

Few of us appreciate how wide the normal variation from the average may be. A very old friend of mine, who died at the age of eighty-three, only had an action of the bowels on an average once a week, yet, as his age and general condition testified, his health was above the average of his contemporaries. I saw an old charwoman some years ago at the hospital, who assured me that she seldom had an action of the bowels oftener than once a month, yet she appeared in good health and never had a headache. Still more remarkable is the case of another patient of mine. When I first saw her she was a woman, aged twenty-nine, who had congenital hypertrophy of the colon (megacolon). I have on two occasions known her to go three months without any bowel action. In spite of this she remains

in perfect health with a clear skin, no signs of auto-intoxication, and, in fact, no alteration in her general condition beyond that produced by the mechanical distension of her abdomen from the retention of so much fæcal material.

It is obvious from such cases that constipation, even though extreme, does not necessarily result in auto-intoxication, and also that there is no hard-and-fast rule with regard to the periodicity of the bowel movements. Some patients normally have two actions per day, and others only have one action every two days. The most common practice is certainly for one daily bowel movement, but we should be very careful about diagnosing constipation simply because the bowels do not act once a day.

Chronic stasis of the large bowel includes all those cases of chronic constipation which are due to a mechanical cause, as distinguished from cases due to errors of metabolism or diet.

At the time when this book was first published there was much discussion in the medical papers about intestinal stasis, and what was called auto-intoxication. One school, led by Sir W. Arbuthnot Lane and Professor Metchnikoff, maintained that the colon was a useless structure which most human beings would be better without, and that as the result of the retention of fæcal material within the colon poisonous substances derived from the action of bacteria upon this material are absorbed into the circulation and cause severe ill-health. The fact that many persons are able to go for weeks and even months without an action of the bowel, and yet suffer from none of the symptoms of auto-intoxication, makes one very doubtful of the truth of this view.

On the other hand, there are certain individuals who suffer extreme distress from the undue retention of fæcal matter in their colon, and get all the poisoning symptoms described by the believers in auto-intoxication. The majority of individuals can go without an action of the bowels for several days without suffering any inconvenience, but most people feel uncomfortable if they go more than a couple of days without an action of the bowels.

The truth probably lies somewhere between the extreme views on both sides. On the one hand, there can be no doubt that all the symptoms of auto-intoxication ascribed to intestinal stasis may be produced without any intestinal stasis being present; and, on the other hand, there are undoubtedly patients in whom the large intestine has completely lost its function, and has become merely an inactive sac in which the products of digestion accumulate and decompose.

The etiology of intestinal stasis, or rather the symptoms which it produces, is still far from being settled. But there are few doctors now who believe that a normal colon is able to allow absorption of poisonous

substances from the material within it, or that auto-intoxication due to intestinal stasis is a disease entity.

It seems much more probable that the cause of the condition is some degeneration or absence of the normal neuromuscular control of the colon wall. It seems not unreasonable to suppose that the muscular wall of the colon may undergo a fibrotic degeneration similar to that which affects the heart. In both cases the flow of fluid through the organ is controlled mainly by the automatic action of the muscle wall, and in both, if this automatic action has degenerated or is interfered with, the normal flow is stopped. The digestive process in a normal individual results in the production of very few poisonous substances capable of being absorbed into the blood, and a normal colon does not at all easily absorb such substances. But when digestion is abnormal and the colon is diseased anything may happen.

The Part played by the Abdominal Wall in Constipation.—This has already been briefly referred to, but must now be considered in more detail. It seems often to be supposed that the colon, and, in fact, most of the abdominal viscera, are suspended in the abdominal cavity by their mesenteries, and that when we find that the transverse colon has become a pelvic organ, it is due to stretching of the transverse mesocolon. A very little thought will soon convince anybody that this is not true. The function of the pelvic mesocolon is to keep the colon in its proper relative position to the remainder of the intestines and abdominal viscera, and to prevent the colon from twisting on itself. A further function is to supply a channel for the bloodvessels and lymphatics to pass to and from the colon.

The mesocolon is not a true suspensory ligament of the colon. If it were, it is quite obvious that it is totally inadequate to support the transverse colon when containing, as it must often do, several pounds of material. Stretching of such a weak structure would be inevitable, and we should all have enteroptosis.

In a normal individual the abdominal wall is a firm elastic structure which maintains a more or less constant pressure within the abdominal cavity. This pressure has been estimated to be as much in some persons as 10 pounds to the square inch. It is probable that it is always in a normal person sufficient to more than counterbalance the effect of the action of gravity upon the abdominal viscera, and that under normal conditions the intestines may be said to float within the abdomen, so that no drag is exerted upon the mesenteries.

If for any reason the abdominal wall becomes weakened, this state ceases to exist, and all the abdominal contents are subject to the effects of gravity, and tend in consequence to become displaced downwards. We see evidence of this in cases where the intra-abdominal pressure is sud-

denly altered, as, for instance, in persons who suddenly lose a great deal of weight. The loss of fat within the abdominal cavity, where much of the normal fat is stored, results in a decrease of space, greater as a rule than the abdominal wall can compensate for; and we know as a fact that marked loosening of the organs commonly results in such cases. The stomach and colon are displaced downwards, and the kidneys and liver become more or less loose. The same thing is not uncommonly seen in women after child-birth, when the abdominal wall has been badly stretched and has been slow in recovering.

It will thus be seen that the key, so to speak, to enteroptosis is the condition of the abdominal wall, and that we should attempt to restore the abdominal wall to its normal condition by suitable exercises, or, failing this, to supply an artificial support to it in the shape of a suitable belt.

There is, I think, no doubt that we have reached the stage when treatment of chronic or habitual constipation by aperients can no longer be considered either rational or justifiable, and that constipation must be tackled on quite other lines than the favourite one of giving drugs, which merely increase peristaltic activity or intestinal secretion. One reason why the use of aperients in these cases is particularly bad is that they tend to hurry the food through the stomach and small intestine, often without doing much to hasten it through the large intestine. The effect of this is that the patient is not able properly to digest the food owing to the rapidity with which it is swept through the small bowel, and, in addition to the bad results of undigested food being carried into the large intestine, the general nutrition suffers from lack of a proper supply.

Moreover, it has been proved by Hurst that most cases of constipation *are due to retention of the colonic contents in the pelvic colon or rectum*, and up to that point the passage of material along the intestinal canal occurs in the proper time. The use of aperients which hasten the bowel contents throughout the entire canal is clearly unsound in the majority of cases.

Undoubtedly the first thing that is necessary is for medical men generally to revise completely their treatment of patients who consult them for chronic constipation. I feel sure that if this were done the number of patients who require operative interference because the large bowel is acting merely as a receptacle for the decomposed products of digestion would be greatly diminished. I am not one of those who believe that in the removal of the colon or its exclusion by short-circuiting from the main alimentary tract we have discovered a cure for most of the chronic infections to which man is heir. But each year one sees a certain number of patients suffering from constipation of so severe a type that they are quite unable to get rid of the by-products of digestion in any satisfactory manner, and have to take poisonous doses of aperients or repeated enemata

even to keep themselves in poor health. I have seen patients in whom an action of the bowels was only produced after heroic measures, and in whom it had become a serious and painful affair and one to be dreaded. It cannot be doubted that in such cases the stage is reached when almost any operation is justifiable which affords a reasonable hope of curing the patient. Such cases, in my experience, divide themselves into two classes: (1) Those in which no obstructive lesion can be found, but in which the large intestine is practically composed of a fibrous sac with no muscular walls and no power of passing on its contents; and (2) those cases in which there are adhesions, either congenital or acquired, which by binding down or constricting the bowel prevent it from properly evacuating the contained material. The worse cases are certainly the former, and it is to those I will refer first.

I once operated on a lady and removed the whole of the large intestine and cæcum. It measured over 3 feet in length and from 4 to 5 inches in diameter. Microscopic sections cut at different levels from the wall showed no trace of muscular tissue, and it was evident that the muscular walls of the bowel had completely atrophied. The colon had become a sac into which everything passed, and which could only be evacuated by gravity and the application of pressure to the abdominal wall. The enormous distension of the abdomen which resulted from accumulated gases within this colon had, however, caused such atrophy of the abdominal muscles that they were unable to assist in evacuating its contents. As the result of the removal of the colon in this case the patient's abdominal muscles became almost normal in three months, and the bowels acted without any difficulty. It had previously been ascertained by careful X-ray examinations that the food passed at a normal rate, and that there was normal peristalsis as far as the ileocæcal valve, but that there was no evidence of muscular contraction beyond this. I would particularly insist upon the importance of carefully ascertaining by means of X-ray examinations whether the small intestine is properly active before any attempt is made to remove the large, as I have certainly seen cases in which the muscular tissue was also deficient in the small intestine, and such cases would not be benefited to any material extent by removal of the colon.

Symptoms.—Constipation is chiefly of importance because of the secondary symptoms to which it gives rise. These symptoms are very numerous, such as headache, dulness, discomfort in the abdomen, backache, furred tongue, etc., but the most important result of severe chronic constipation is the condition often called auto-intoxication. When the contents of the colon are unduly delayed in their passage to the anus, and remain long retained within the body, certain alterations take place. Chemical changes occur in the fæcal material, and many of the waste

products of digestion become still further split up into poisonous substances or toxins. Under normal circumstances there would not be time for the formation of poisonous by-products before the fæces are discharged from the body; but in chronic constipation considerable quantities of these may form while the fæces are still in the colon, and may then be absorbed by the bowel wall and find their way into the blood-stream. The patient, in fact, is slowly poisoned by toxins formed within his own colon, but it is doubtful if this can occur unless the colon itself is diseased.

We have good evidence of the extremely poisonous nature of these toxins in cases of intestinal obstruction. Here, when death occurs, it is more often due to a profound toxæmia from the poisons generated within the obstructed bowel than from the obstruction itself.

The toxæmia in chronic constipation is never so serious or profound as in intestinal obstruction, because the poisoning occurs more slowly, and the bowel wall being undamaged, absorption does not occur so readily. It often, nevertheless, produces after a time very serious consequences. The patient becomes lethargic and listless. The appetite is poor, and there is a general feeling of not being well. The skin, instead of looking healthy, becomes of a greyish or earthy colour. The tongue is coated, and frequently much of the subcutaneous fat disappears. There is generally a chronic headache, and sometimes severe neuralgia and even more serious mental symptoms have occurred. The appearance of patients suffering from chronic auto-intoxication is often quite characteristic, the listless appearance and the colour of the skin being alone sufficient to identify them as the subjects of chronic constipation.

The number of symptoms which have been ascribed to auto-intoxication would include almost all that can be found between the covers of a general textbook of medicine, and I shall certainly not attempt to enumerate them here.

As a rule the chief character of such symptoms is a faulty metabolism, and an inability to deal properly and usefully with the ordinary food materials. Loss of weight is very common, and often serious. Many of the symptoms are referred to the nervous system. Thus mental despondency is very frequently met with in a marked degree. There is considerable evidence that the endocrine glands are seriously affected in association with stasis in the colon, and that many of the more prominent symptoms may be attributed to this factor.

Many patients who suffer most severely from auto-intoxication have not got stasis; although the two conditions may be associated, they are not necessarily so. It is not uncommon to see patients who have all the symptoms of intoxication, and yet have a daily action of the bowel. Again, one sees markedly toxic individuals whose bowels can be got to act regularly with enemata, but without relieving them of their symptoms.

I know some surgeons explain these cases by saying that the bowel is not sufficiently emptied, but we have to bear in mind that the colon is not meant to be empty, and these patients certainly get evacuations which should be sufficient in a normal individual.

It is quite certain that the most extreme cases of colon stasis often do not suffer from toxic symptoms at all.

In patients with well-marked auto-intoxication, on the other hand, the retention of any fæcal material within the colon for more than twenty-four hours produces quite alarming symptoms.

To my mind, it is clear that it is not the stasis which is the cause of the trouble, but the fact that some change has occurred in the wall of the bowel which allows toxins generated in the intestine to be absorbed direct into the blood-stream. Whether these toxins are normally present in the colon, but are not absorbed by a normal bowel wall, or whether the toxins are abnormal and the damage of the bowel wall is secondary, we cannot at present say.

Atonic Constipation.—Atonic constipation results from the muscular action of the bowel wall being deficient. This is apparently not due to any reduction in the number of the unstriped muscle fibres, but to the absence of the normal stimuli. Peristalsis is normally a reflex action set up by the presence of material within the bowel; in atonic constipation this reflex becomes sluggish. Most often this constipation is a secondary condition resulting from irregular habits in going to stool, improper diet, visceroptosis, or some other general trouble. It may be associated with loss of tone in the abdominal muscles, and this becomes important, since it is upon these muscles that the expulsion of the fæces chiefly depends. In elderly persons there is definite weakness or loss of tone in the muscles of the entire body, and the muscular walls of the intestine are, of course, included. The tendency to constipation which so frequently accompanies old age is thus a natural process, and is quite correctly treated by a suitable aperient. Most people after a few experiments find a suitable pill or tabloid which gets them over the difficulty and keeps their bowels regular.

Treatment.—The treatment of chronic constipation obviously depends upon the conditions underlying it, and the correct method is to ascertain these causes and to correct or remove them. When due to obstruction, such as a chronic volvulus, adhesions, a tumour or stricture, operation is clearly indicated. For the treatment of obstructive constipation, the reader is referred to other portions of this book.

In atonic constipation, treatment should be directed to improving the tone of the bowel wall and increasing the normal stimulus to peristalsis. For this purpose a course of massage, combined, if possible, with suitable electrical treatment, is usually most efficacious if properly carried out. Strychnine or nux vomica is most useful in increasing the peristaltic

movements, and their action is often enhanced by the addition of belladonna. At first these drugs should be combined with a small amount of some mild aperient, and later, when they have begun to do good, should be used alone. I have found the following pill most useful in these cases:

℞	Ext. colocynth. co.	grs. xii.
	Ext. cascaræ	grs. xii.
	Ext. belladonnæ	grs. iii.
	Ext nucis vomicæ	grs iii.

Mitte pil xii One or two at dinner-time each night.

The results of treatment in cases of chronic constipation are far better where aperients are not used. They are an easy means of getting the bowels to act; but they do not remove the cause of the condition, and as a rule ultimately result in making it worse, or in the patient being condemned to continue their use.

Occasionally, where there is a gouty element, the use of some aperient water containing small doses of magnesia and lithia is very beneficial, but with a few exceptions aperients are best avoided.

Enemata are in many cases much to be preferred to the use of aperients, and especially where for long periods some artificial aid has to be used to insure the bowels acting.

There are frequent instances where the abnormal solidity of the fæces is a most important factor in maintaining the condition; here it will be found that if steps are taken to prevent the fæces from becoming solid, a marked improvement will quickly result. In a few cases merely increasing the amount of fluids drunk during the day will be sufficient; but as water is readily absorbed by the colon wall, this will only be of service where the patient has been in the habit of taking less fluid than his tissues require, and in whom, therefore, the deficiency has been made up from the fæces.

Fats, which are liquid at body temperature, will prevent the fæces from solidifying, and as only a very limited quantity of fat can be absorbed by the alimentary tract, it is quite easy to attain the desired result by giving an excess of fat in the diet. The addition per diem of 2 ounces of thick cream to the patient's diet will generally render the stools quite soft, and it is easy to ascertain by experiment the exact quantity of fat required. Salads with oil, milk, bacon, and other forms of diet which contain fat, will readily suggest themselves. Some patients, however, are unable to take an excess of fat without getting dyspepsia.

Mineral fats have not this objection; they are not absorbed at all in their passage through the alimentary canal, but pass out as they went in. Petroleum in some form can be given for any length of time without causing harmful results, and by administering suitable quantities of it any desirable consistency of the fæces can be obtained.

Even some cases of obstructive constipation are very much improved by rendering the fæces soft, and as an adjunct to massage and electricity it is most useful in cases of constipation due to adhesions. I have had several patients who for years had been in the habit of taking aperients daily, and whose bowels only acted as a result of medicine, who have been able entirely to stop the use of aperients when they began to take petroleum.

Massage.—This is one of the best methods of treating atonic constipation, and cases where there are adhesions interfering with the movement of the bowel. It is also useful after operations undertaken for the cure of obstructive constipation. For the success of this treatment it is essential that a skilled masseur or masseuse be employed; partially trained persons are of little use. Before commencing the massage the patient should be put on a full diet containing plenty of cellulose and a sufficient quantity of fat, or its substitute petroleum, to insure the fæces being unformed.

If possible, it is better to commence with massage for ten minutes twice a day about two or three hours after meals. This is very much better than one treatment of longer duration, and is more easily borne by the patient. The massage must at first be very gentle, and only slowly increased as the patient becomes accustomed to it. Very vigorous massage is a mistake, and does far less good than light massage. We should aim at moving on the contents of the colon by stimulating peristalsis and by direct kneading of the colon in a direction towards the anus. Special attention should also be paid to the development of the abdominal muscles, and for this purpose the exercises described below are most useful, and may with advantage be combined with the massage. After a few days, if the massage is well borne and does not cause discomfort, each treatment may be slowly increased up to twenty minutes twice daily. There is little to be gained by continuing it for more than twenty minutes at one time. As soon as massage is commenced all aperients should be stopped, if they are being taken. Usually the bowels at once commence to act naturally; should they not do so, enemata of soft soap and water should be used. The massage should be continued daily for at least three weeks, and if possible longer; after this, for two or three times a week for another six weeks or two months. Patients often object to the inconvenience of daily massage; but I have found it most important, unless only temporary benefit is to result from the treatment.

When the patient has sufficiently improved as the result of the treatment, and the bowels are acting regularly, he should be told to take daily exercise, preferably walking or riding; and to make a habit of relieving the bowels at the same time each day. Cannon-balls covered with wash-leather, and various forms of rollers, are often used in the treatment of

constipation by massage, but if a skilled masseur is obtainable artificial aids are unnecessary.

Vibration, if proper apparatus is used, is also a useful aid to massage in these cases.

Exercises for developing the Abdominal Muscles.—The following exercises should be carried out daily, at first under the supervision of the masseur, and later by the patient for himself. They should be done in succession, and continued about fifteen minutes, but never for long enough to cause fatigue. Each movement should be done slowly and deliberately. When the patient is also having massage, it should follow the exercises.

Exercise 1.—The patient should lie flat on his back on a firm bed or upon the floor, and with his hands by his sides. The knees should be drawn up to the chest, then straightened out at right angles with the trunk. With the knees kept stiff, the legs should then be slowly lowered until they again touch the bed.

Exercise 2.—With the patient lying as before, the right leg, with the knee kept stiff, should be slowly raised till it is at right angles with the body. It should then be slowly lowered again, still with the knee stiff, stopping for a few seconds at different angles with the trunk. Two or three stops should be made before the leg again rests on the bed.

The same exercise should be carried out with the left leg.

Exercise 3.—The patient should lie on the floor with his hands by his sides. Then, while his legs are held down, he should slowly raise himself into a sitting position without using his hands. The body should be twisted round, first in one direction and then in the other; he should then slowly lie down again.

Exercise 4.—The patient stands up and slowly raises first one leg and then the other. Each knee should be brought up until it touches the chest.

Exercise 5 —The patient stands with his hands on his hips and slowly rotates the body, first in one direction and then in the other.

Exercise 6.—Repeat Exercise 2, but with both feet together instead of alternately. This and Exercise 7 should not be used at first, but may usefully supplement the foregoing exercises at the end of a week or ten days.

Exercise 7.—The patient sits on the floor, and the feet are held down. He then slowly sways himself backwards and forwards from the hips.

Exercise 8.—(This is to develop the gluteal muscles.) With the hands on the hips, the patient squats down on his heels, then slowly raises himself into the standing position, and again slowly lowers himself until he is sitting on his heels. This should be repeated two or three times.

Electrical Treatment.—There are many different kinds of electrical treatment used for chronic constipation; some are quite useless, as they

do not cause contraction of the unstriped muscle of the bowel wall. This especially applies to small galvanic and faradic apparatus, which can be obtained for a few pounds; such apparatus are quite valueless for this purpose, and if benefit does occur after their use, it is due to suggestion rather than to electricity.

One of the forms which seems to do most good in atonic cases is the application to the abdomen of a continuous current with quick reversals, one reversal each minute. The pads should be large, and applied one on each side of the abdomen. A cushion must be placed between the knees to prevent their knocking together and becoming bruised. The current should go up to 100 milliamperes. Each treatment should last about ten minutes, and not be repeated oftener than thrice a week.

Hydrotherapy in its various forms is now very popular for the treatment of chronic constipation, especially at the English and Continental spas. Personally, I have not seen as good results from it as from massage and electricity.

The so-called Plombières treatment, or lavage of the bowel, is not suitable in atonic constipation, as it dilates an already weakened and dilated colon, and, I believe, tends to increase and accentuate the atony of the bowel wall rather than to improve it. It undoubtedly does temporary good by clearing out the colon and washing away scybala, but the improvement is seldom permanent, while some cases are certainly rendered worse by it.

There are several different methods of administering high enemata. The least satisfactory is that where very large quantities of water up to 2 quarts or more are used, as, while such enemata effectively wash out the colon, they tend to unduly stretch the muscular wall. Enemas can easily be made to reach the cæcum by getting the patient to assume the knee-elbow position for a minute after giving the enema. This position allows water to run round to the cæcum by gravity, and is much better than forcing fluid round the colon. A new method is in use now by which a long rubber tube can be passed right round to the cæcum by allowing water from a receiver to run in and out while the tube is being passed. After the tube has been introduced the whole colon can be flushed out with any desired solution. Whatever method is used, great care must always be exercised to avoid damaging the colon, and only soft rubber tubes are permissible.

Of recent years there has been a craze for irrigation of the colon, and in the writer's opinion it has been very much overdone. The apparent success of the Plombières douche has resulted in wholesale washing out of the colon, often without any due regard to what the patient is suffering from. In cases of atonic constipation the benefits of irrigation of the colon are only temporary, and much harm is often done by very large

irrigations, which stretch and weaken an already damaged intestinal musculature.

Operative Treatment.—Operations which are performed for chronic constipation without reference to the underlying pathological cause cannot be considered as satisfactory or scientific procedures; before advising operation, there should be a clear understanding of the pathological conditions at work, and the manner in which they are to be benefited.

In most cases of obstructive constipation, surgery affords the only satisfactory means of dealing with it or of curing it. The various methods employed will be found elsewhere in this book.

There are certain cases of atonic constipation in which operation is called for; but these are exceptional, and in all of them, if a thorough course of non-operative treatment has not already been tried, it should first be prescribed.

The cases which require operation are those in which the patient is getting seriously ill from auto-intoxication, and the bowels cannot be made to act regularly either by enemata, aperients, or massage. Cases are occasionally met with in which nothing seems to do good, and patient and doctor are in despair. The patient has spent months at spas without any permanent relief; massage only causes discomfort, and only the most drastic aperients, and those in full doses, will relieve the bowels. The patient is always ill, and can think of nothing else but the condition of the bowels, and is rapidly becoming a chronic invalid.

There are undoubtedly cases in which the large bowel becomes not only absolutely useless to fulfil its normal function, but is a serious danger to its possessor, and is interfering with the correct functioning of all other organs. There can be no doubt in such cases that, unless the condition can be remedied by some more simple procedure, the entire colon should be removed.

Operations designed with a view to remedying severe cases of intestinal stasis are in their infancy, and much work has still to be done and many observations have yet to be made before we can hope to sift the wheat from the chaff.

The following are the operations which have been performed for this condition:

1. Division of bands and adhesions so as to free the gut, and fixation of those parts of the colon which appear to be movable (see Chapter XXV).
2. Colectomy.
3. Ileo-sigmoidostomy.
4. Author's method of short-circuiting the splenic angle.
5. Appendicostomy.

Colectomy.—While this operation must always be one of the most serious of surgical procedures, and one by no means lightly to be undertaken by

anyone not thoroughly experienced in abdominal surgery, the results as regards immediate mortality in the hands of a first-class surgeon have proved better than might have been expected. The operation has not an unreasonably high mortality, particularly when we bear in mind that many of the patients are in a very poor state of health. It is impossible to give any reliable figures with regard to the mortality of this operation. It is much to be regretted that up to the present no good series of cases with the percentage mortality and subsequent history of the patients surviving the operation has been published. The figures from Guy's Hospital, collected by Hurst, showed a mortality of 16·5 per cent. in 199 cases of colectomy. It would seem that the operation must inevitably be attended by a certain definite mortality, and for this reason it should not be lightly undertaken unless there is no alternative.

At one time it was thought that ileo-sigmoidostomy, which is a much safer operation, would give as good results. Time, however, has shown that the results in cases of ileo-sigmoidostomy alone are exceedingly unsatisfactory, except in a few cases, and few surgeons would now advise it.

The operation of joining the most dependent portion of the transverse colon to the upper end of the rectum by lateral anastomosis, which I have performed for some time, has given such satisfactory results that it would seem to offer a good substitute for the more serious operation of colectomy, as it should not be accompanied by anything like the risk necessarily entailed by a complete colectomy.

It was at first feared that colectomy would result in the patient being permanently invalided from chronic diarrhœa. This has proved not to be the case in patients with intestinal stasis whose colon has been removed. Diarrhœa is very exceptional after the operation; in fact, in my own experience, patients generally require some mild aperient occasionally, and one of my patients, who has had the entire colon removed, has to take a small dose of cascara daily. On the other hand, patients in whom colectomy has been performed for some condition other than stasis do appear to suffer from diarrhœa.

In some cases very considerable trouble has resulted subsequently from adhesions involving the small intestine. We are still rather in the dark as to why this should occur in some cases rather than in others, and it is probable that the actual technique has something to do with it. There is reason to believe that removal of the ileocæcal valve is harmful, as it does away with the anaerobic conditions normally present in the ileum, and allows infection to spread upwards from the colon. For details of the operation see p. 583.

Ileo-Sigmoidostomy.—As a method of treating cases of intestinal stasis it has not proved satisfactory, except as a preliminary to colectomy, the

reasons for this being that the fæcal contents tend to travel back from the anastomosis into the cæcum, causing considerable distension of the cæcum and transverse colon. While this does not always occur, it has done so with sufficient frequency to render the operation quite unsuitable, and in several cases a subsequent colostomy has been necessary in order to get over this difficulty. Another method which has been adopted with some success is to perform appendicostomy at the same time, so that the large bowel can be flushed out when necessary.

Author's Method of Short-Circuiting the Splenic Angle.—It has always seemed to me that the chief cause of trouble in cases of atony of the colon with enteroptosis was the difficulty experienced in getting the fæcal contents past the splenic angle, the tendency being for them to collect in the large pendulous transverse loop, and some years ago it struck me that this might be got over by a lateral anastomosis between the apex of the transverse loop and the upper end of the rectum.

I have now performed this operation a considerable number of times, and the results have been very satisfactory. The operation is a comparatively simple one, and consists of making an incision either in the midline or a diagonal incision on the left side. The apex of the transverse loop, having been found, is brought out of the wound and shut off with rubber-covered clamps. The upper end of the rectum or the lowest part of the sigmoid flexure is then similarly brought out and clamped off. The exposed portions of the bowel are now completely surrounded with towels, and a lateral anastomosis performed between them, the openings being made on the side opposite the mesentery and a large stoma not less than 2½ inches long established. This completes the operation with the exception of closing the abdominal wall.

I have now performed this operation a number of times, and so far it has shown no mortality and recovery has been uneventful. The results have been better than might have been expected. Regular action of the bowels has been established at once and has continued, while the other symptoms have cleared up.

The success of this operation seems to prove that the large sagging transverse colon is the chief source of trouble, and that when this is drained at its most dependent point the difficulty is overcome. So far there have been no signs of trouble from regurgitation of the fæcal contents into the short-circuited loop, probably because this is drained at both ends, and stasis within it is opposed by the action of gravity.

The following is the most striking of the successful results from the operation:

Case.—Mrs. R——, a lady aged thirty-five, was sent to me by her doctor with a history that for eight or nine years she had suffered from most severe constipation. Every kind of treatment short of operation

had been tried, but without success. She had lost weight to a considerable extent, and was a chronic invalid. Enemas were useless, and she could only get her bowels to move by heroic doses of aperients, and then without any regularity. She had frequent pain in the abdomen, and had well-marked symptoms of auto-intoxication. She was very anxious to have something done for her. When I first saw her she was taking over 4 grains of jalap daily, and in spite of this was constipated, and only got relief after many hours of discomfort and pain. X-ray photographs showed a most severe degree of enteroptosis.

I operated upon her, and joined the most dependent part of her transverse colon to the upper end of the rectum. Her bowels at once began to act regularly and her symptoms disappeared. A year after the operation she had put on weight and was in excellent health. She seldom required an aperient, and when she did, a single grain of cascara was sufficient.

Appendicostomy.—Appendicostomy seldom effects a cure, but gives definite relief in most cases, while in a certain number it enables the patient to lead a normal life and remain in good health so long as the bowel is kept washed out. In one case, at least, the patient was completely cured by appendicostomy. He was an extreme case of auto-intoxication, with all the typical symptoms and such marked wasting that it seemed impossible that he could recover. He made an excellent recovery, however, and the opening was allowed to close a year after the operation. He is now in perfect health, over four and a half years since the operation. This is, however, an exceptional case, and more usually the operation only alleviates the symptoms.

Results of Operations for Intestinal Stasis.—A very considerable number of operations for auto-intoxication and stasis have now been performed both in this country and in America, and it is much to be regretted that the surgeons concerned have not reported their cases in more detail. What we want to know is, first of all, the condition of the patient before the operation; and, secondly, his condition a year or two years after operation. The condition of the patient a month after operation is absolutely of no value. In reading descriptions of published cases one too often comes across the remark that the "patient left the hospital cured." I remember reading a paper describing nineteen operations for colectomy in which it was stated that all except one of the patients were discharged from the hospital cured. All this really means is that, while one patient died, eighteen left the hospital alive. What one does want to know is what their condition was a year or more later.

Before any definite conclusions can be come to with regard to many of these operations, it will be necessary to have carefully recorded and complete notes of a number of patients both before and for some years after operation. More particularly is this the case where apparently excellent results have followed the division of adhesions or membranes. Too often

the surgeon, finding a kink or adhesion where he expected to find it, is satisfied that he has been able to cure the patient. I must admit that I, too, have often been satisfied on finding such marked adhesions, but as the result of considerable experience of such cases I have been led to question seriously whether in many the adhesions were really the cause of the trouble. Too often one finds that only temporary relief follows operation.

So few reliable figures have been published on the after-results of colectomy that I am forced to fall back very largely on my own experience. I have one case where the colon was removed over seventeen years ago for complete atony of the large intestine, and this patient has been in better health than she had been for ten years previous to operation. She is herself eminently satisfied with the results of the operation, and from being a chronic invalid has become a normal member of society. She is not, however, a perfectly normal individual; she has to be careful of her diet, and she is still occasionally troubled with flatulence and is below the normal weight, although much heavier than she was previous to operation.

I have another patient whose colon was removed eighteen years ago. This patient has put on weight, and until just recently was quite normal as regards weight, but she has usually four stools a day and has to drink more fluids than is normal for a person of her weight and age.

Slesinger traced 25 of Lane's cases for a period of about seven years: 18 of these were quite well, 3 were better, 2 were not better, 2 subsequently died. Although these figures are too few to give any very definite conclusions, they appear to show that where the operation of colectomy is done in extreme cases of stasis where the bowel has completely degenerated the results are on the whole good, and the patients are permanently benefited as the result of the operation. On the other hand, where the operation has been performed on cases where the colon is not seriously degenerated, the results are far from satisfactory—in fact, some of them appear to have been made invalids by the operation.

Hurst maintains that the removal of the ileocæcal sphincter has a most harmful effect on the digestion, and allows ascending infection of the small gut.

The whole may be summed up by saying that there are undoubtedly cases in which the large intestine has so completely lost its normal function as to become a useless sac, in which the products of digestion accumulate and decompose with disastrous results to the patient's general economy. In such cases colectomy is the rational treatment, and may be expected to give good results; but cases should never reach this stage, and in the future, when scientific medical treatment has come into its own, colectomy for stasis will be unnecessary.

As has already been stated, an ileo-sigmoidostomy has been definitely proved to be unsatisfactory.

CHAPTER XXVII

ULCERATIVE COLITIS

ULCERATION of the colon resembles that of the skin, inasmuch as it may result from a great many different conditions and occur in many different forms. Thus it may arise secondarily to some constitutional trouble, such as Bright's disease, gout, or plumbism. It may result from a specific infection, as in amœbic dysentery, Shiga's bacillary dysentery, enteric fever, tuberculosis, and possibly syphilis. It may occur from malignant disease, or as the result of hardened and long-retained fæcal masses, such as the ulceration caused by a stercolith, or in the dilated bowel above a stricture. It may follow damage to the blood-supply of the colon, as in some cases of cirrhosis of the liver and in embolism of the mesenteric arteries. Or it may result from trophic changes due to interference with the innervation of the colon; two such cases are recorded by Sir William Hale White in which the patient had a fractured spine and paraplegia.

Much of the confusion which surrounds the subject has arisen from the fact that investigators have often failed to sufficiently recognize the great number of different causes of ulceration in the colon, and, confusing several together, have attributed all to some specific cause.

Ulcerative colitis used to be considered so fatal a disease that some writers have maintained it cannot be recovered from, and that the reported cases of recovery were not true ulcerative colitis. This is a not uncommon error when a disease is studied only upon the post-mortem table, and there is no other means of arriving at a correct diagnosis.

At the discussion on ulcerative colitis which took place at the Royal Society of Medicine in January, 1909, figures were obtained from most of the London hospitals, and they proved that the mortality up to that date was over 50 per cent.

There has undoubtedly been a considerable improvement in the mortality since then, but it has not been as great as might have been expected. No such comprehensive figures have since been available, but in 1933 Hardy and Bulmer reported ninety-five consecutive cases admitted to the General Hospital, Birmingham. Of these, thirty-one died in spite of treatment, which gives a mortality of about 35 per cent. It is thus evident that the mortality from ulcerative colitis is still very high.

Etiology.—The disease is one of early adult life; thus, out of my series of sixty cases, the average age is thirty-seven.

The sexes appear to be equally affected. The commonest age is between twenty and thirty, and the next commonest between thirty and forty. *It occurs occasionally in children, and the prognosis is then very bad.*

There seems to be a very definite hereditary susceptibility to the disease, but it is not possible at present to say in what this consists. I have met with several cases where the condition has been present in successive generations. When we come to know more about the genetic factors in disease, I believe we shall find that heredity has a great deal to do with the incidence of ulcerative colitis.

In many cases ulcerative colitis is an end result of amœbic or bacillary dysentery. This is particularly liable to be the case if the original acute dysenteric attack has not been completely and adequately treated. There were a large number of men who suffered from dysentery during the war, either at Gallipoli or Egypt, who subsequently developed ulcerative colitis; these cases neither showed amœbæ in the stools nor reacted to the treatment for amœbic dysentery.

This type of ulcerative colitis following tropical dysentery does not appear to differ in any way from the ordinary cases of ulcerative colitis *which are endemic in this country. In all cases an infection of the mucous* membrane of the colon takes place and becomes progressive. It would appear that this infection may be due to different organisms, and that there is no specific organism which produces the disease. The worst cases would appear to be due to infection with a streptococcus, and it would seem probable that the mode of infection in most cases is by the mouth.

There are good reasons to suppose that very often one form of ulceration becomes secondarily infected with another organism. This is perhaps best seen in the case of dysentery. The patient gets a definite amœbic dysentery, and the ulceration is due to the amœbæ. This either runs its natural course or is cured by emetine injections, and the patient appears to get well. *He then gets secondarily infected* while the colon is still in a condition of lowered vitality, and we find a typical acute ulcerative colitis which does not in any way conform to the amœbic type, and in which streptococcic organisms, and not amœbæ, can be found on bacteriological examination. In the same way cases are seen where the patient has for some time suffered from a mild form of ulcerative colitis, and then suddenly becomes secondarily infected and develops a dangerous and severe form of ulceration of the colon. The following well illustrates this type of case:

Case.—The patient was a doctor, aged thirty, who had for some three years suffered occasionally from mild attacks of colitis accompanied by diarrhœa and occasional bleeding from the bowel. The attacks had never been serious. While he was laid up with one of these attacks he was poisoned with milk which was badly contaminated with *Strepto-*

coccus aureus. Several other people who were having the same milk supply were rendered ill by this contaminated milk, and a bacteriological test of the milk subsequently proved that it was badly contaminated with this organism. The patient immediately got much worse, with high temperature, severe bleeding, and constant diarrhœa. He became exceedingly ill, and it seemed improbable that he would recover. Examination of his stools proved that a streptococcus infection was present. He was operated upon and an appendicostomy performed, and he made a slow recovery.

In many of the cases of ulcerative colitis it is impossible to be certain what organism is the controlling factor. It seems probable that secondary infections nearly always occur, and that several different organisms are associated in producing the ulceration. The most serious cases are those associated with a streptococcus infection.

Bacteriology.—Bacteriological investigation of ulcerative colitis has not so far been very satisfactory. One of the great difficulties in connection with the investigation of these cases by bacteriological means is that so many organisms are present, and that in the majority of cases it is impossible to be certain which is the controlling one.

At one time it was thought that Shiga's *Bacillus dysenteriæ* and Flexner's acid bacillus were the cause of ulcerative colitis; but while they undoubtedly may be in certain cases, notably in asylum dysentery, there is no doubt that a great number of other organisms can also be responsible. In a few cases the *Diplococcus pneumoniæ* produces ulcerative colitis.

This is a rare form of acute colitis, and generally occurs as a primary infection and not secondarily to a lung infection.

In all the cases that have come under my observation, very severe hæmorrhage from the bowel and high temperature have been the most marked symptoms. It is a very serious disease, and may end fatally either from toxæmia or from the very severe hæmorrhage which accompanies it.

Sir William Hale White points out that whitish membranes may form on the ulcerated colon, but he considers that these membranes are only an expression of the intensity of the inflammatory process. I have personally seen these membranes with the sigmoidoscope in such cases, and in one case where I performed an appendicostomy for pneumonic colitis the wound became infected and greenish-white membranes formed all over the raw surface.

The best treatment is immediate appendicostomy performed under local anæsthesia. This enables the colon to be kept constantly irrigated and controls the bleeding, while at the same time it checks the toxæmia by washing away the discharge from the ulcerated area. It is most important that the operation should be performed as early as possible, since the disease runs a very acute course.

In those cases which have come under my observation a pure culture of *Diplococcus pneumoniæ* was separated from the stools. The following case illustrates this rather rare condition:

Case.—A young lady, aged twenty-five, was suddenly taken ill. She had a high temperature (101° to 103°), abdominal pain, and profuse hæmorrhage from the rectum. The stools consisted of almost pure blood, and occurred about every half-hour. In order to check the bleeding an appendicostomy was performed, and the bowel was washed out every six hours with hazeline solution. Cultures taken from the stools showed *Diplococcus pneumoniæ* in large quantities. The patient recovered after a severe illness, and at no time had any signs of consolidation in the lungs.

A great deal of research work has been carried out to try and discover a primary infecting organism in these cases. Various protozoa have been accused of causing the disease, but none has so far been proved guilty. Bargen's diplostreptococcus has also been stated to be the primary infective agent, but so far no one organism has been found present in all cases as an etiological factor. The most serious cases are those where the *Streptococcus hæmolyticus* is found to be present or the *Diplococcus pneumoniæ*. On the other hand, organisms may be found in quite mild cases. It seems probable that some biological abnormality or some special susceptibility of the patient is a far more important factor than the nature of the infecting organism.

Pathology.—Many different types of ulceration are seen in the colon, and it is not at present possible to say whether they are different kinds of ulceration or only different degrees of the same type.

In some cases the mucous membrane is so destroyed by ulceration that little normal membrane can be seen anywhere in the entire colon, while in others there are only a few isolated ulcers in one or more parts of it. In the majority of cases in which a post-mortem examination has been made the entire colon was more or less ulcerated. In most of the records I have been able to find the colon was the only part diseased, except for septic lesions, such as abscess or peritonitis, the secondary consequence of the ulceration.

The lesions vary in size from quite small, punched-out ulcers the size of a pea up to large irregular tracts covering many inches. When examined during life with the sigmoidoscope, the edges of the ulcers can be seen to be raised, and to have a bright red areola. The base is generally covered with fine granulations, and there is often either white adherent mucus or a yellow slough adhering to the surface. These sloughs, however, quickly become detached by the constant diarrhœa, and consequently are not commonly found in post-mortem specimens.

The ulcers are most often seen, and appear to commence in the hollows of the bowel, such as in the depressions between the valvulæ conniventes

and in the bases of the sacculi. When the disease is extensive, the ulcers tend to run together and become confluent, so that they assume a most irregular outline. Small islands of normal mucosa often remain in places, and stand out like polypi above the surrounding ulceration; similarly, narrow bands or bridges of mucous membrane may be left between the ulcers, and this often gives the bowel a most curious appearance. At first sight it appears as though covered with polypi, but a closer inspection shows these to consist of islands of swollen mucous membrane surrounded by ulceration. In some cases the ulceration has spread almost uniformly over the bowel, in others longitudinally, leaving long ridges of normal mucosa standing above the surrounding ulcerated surface. Again, the ulceration may have spread circularly.

Occasionally the ulcers are all more or less discrete, though numerous, and the appearance is as if the mucosa was honeycombed or trabeculated. They are commonly numerous, and extend throughout the greater part, if not the whole, of the colon; but in a few cases there have been not more than one or two large ulcers (see Fig. 183).



FIG. 183.—ULCERATIVE COLITIS (SIGMOIDOSCOPIC)

The depth of the lesions varies considerably, in some the mucosa appears as if scraped or sand-papered, so that the surface is entirely removed. This condition is seen in cases examined with the sigmoidoscope, and probably represents an earlier or milder stage of the disease than is observed in the post-mortem specimens. The surface is raw, bleeding, and has a granular appearance. Often the greater part of the mucosa is destroyed; in severe cases the muscular coat is exposed in the base of the ulcers, while in some the floor of the ulcer is formed by peritoneum only. In the chronic type there is usually considerable thickening of the bowel wall from fibrous tissue.

If the ulcers have perforated the muscular coat, there may be some local peritonitis and adherent lymph on the outside of the bowel. The mesenteric glands may be enlarged, and this was noted in several of the recorded cases, though in many there was no glandular enlargement.

There is nothing distinctive in the microscopical appearances of ulcerative colitis. Sections of the wall of the colon through an ulcerated area show the ordinary characters of simple inflammation. In the less severe cases the glands of Lieberkühn are seen to have undergone cloudy swelling and to contain fibrinous material in their lumen. The submucosa is usually much thickened, highly vascular, and there is a general round-celled infiltration. The muscular coat is infiltrated with leucocytes, and

where the ulceration is deep the fibres are destroyed. The peritoneum is thickened.

Where the ulceration has extended through the whole depth of the mucosa, the islets of mucous membrane left between the ulcers can be seen to have become thickened and swollen, with the result that under the microscope they present the appearance of polypi covered with mucous membrane. In some instances the ulceration can be seen to have extended under the mucous membrane, leaving it attached by a narrow stalk.

The causes of death in the cases which I have been able to collect were as follows:

	Cases
Perforation and general peritonitis	9
Exhaustion	17
Septicæmia	4
Embolism	2
Anuria	1

Perforation is thus a common cause of death. In nearly all the ulcer which had perforated was in the cæcum or sigmoid flexure; in only one was there a perforation in the transverse colon, and in that a large portion of the transverse colon had sloughed right away. In two cases there was more than one perforation. In one a perforation into the general peritoneal cavity was present in both the cæcum and sigmoid flexure, and in the other there was an ulcer in the cæcum the size of a shilling opening straight into the peritoneal cavity, and five or six others, also perforating, in the cæcum and ascending colon. It is difficult to see how more than one perforation can occur, but it is possible that some sudden strain or distension of the bowel with gas caused several ulcers to give way at the same time.

Perforation of an ulcer may occur without causing general peritonitis; in several of the cases a local abscess or pericolitis had resulted, and was shut off by adhesions from the general peritoneal cavity. In one there was a large abscess in the pelvis communicating by several large perforations with the interior of the cæcum. In another there was a pericolic abscess in connection with the sigmoid flexure due to an ulcer which had perforated. In one case the bases of some of the ulcers had become adherent to neighbouring coils of small bowel, and perforation had occurred into the small bowel. There was a communication between the ascending colon and the small intestine, and another between the ascending colon and the ileum.

Adhesions between different coils of bowel or between the colon and the parietal peritoneum are not uncommon, and once or twice it was found post-mortem, on separating the adhesions, that several ulcers had perforated.

Although abscess of the liver is a common complication of amœbic dysentery, it is uncommon in other forms of ulcerative colitis, and was only present in two of the cases I have collected. In one of these the abscess was single, in the other there were multiple abscesses. Neither of these patients had ever been out of England, and there was no reason to suppose they had amœbic dysentery. One would expect portal pyæmia to be a common complication, but out of nearly sixty cases it was present in these two only. In one other instance there were symptoms of liver abscess, but the patient recovered without operation.

Hæmorrhage serious enough to threaten life may result from an ulcer opening up an artery, and in hæmorrhagic colitis the bleeding is the most serious symptom. General peritonitis may result from ulcerative colitis without any perforation being present.

Symptoms.—The main symptom in all cases is diarrhœa, and it is this which draws attention to the disease. It may begin suddenly, accompanied by severe abdominal pain, or, rarely, may come on insidiously with a slight looseness of the bowels. Usually the patient states that the pain and diarrhœa started quite suddenly, without any very apparent cause. The stools increase in frequency, and blood appears. The ordinary remedies as a rule have no effect upon the diarrhœa, and the patient rapidly loses weight and becomes extremely ill. The number of stools varies considerably. A common number is six to eight, and I have seen several instances where there were forty, in the twenty-four hours. The stools are quite watery, and contain comparatively little fæcal material, consisting mostly of mucus, blood, pus, water, and undigested food. In a severe case of ulcerative colitis the food passes through the alimentary tract with surprising rapidity. If charcoal is given with the food, we can easily ascertain how long any particular feed has taken in traversing the alimentary canal, as the excreta will be coloured black. If this test is applied, it will be found that a feed will sometimes appear in the stools in as short a time as three hours. It is not surprising, therefore, that in bad cases we sometimes see milk in the stools almost in the condition in which it was swallowed. In the worst cases the patient is practically unable to digest anything, and wasting and loss of weight are in consequence rapid and severe.

In the acute cases there is a marked toxæmia, with delirium and restlessness. The skin is dry and of a dull white colour.

The amount of blood in the stools varies; in some cases it is considerable, while in others it is only present occasionally in small quantities. It is usually fluid and intimately mixed with the stool; it may, however, appear as small, jelly-like clots.

The desire to go to stool is sudden and urgent, but defæcation is not as a rule accompanied by tenesmus. Personally I have never seen a patient

with ulcerative colitis in whom there was well-marked tenesmus, and although some writers give it as a common symptom, I believe it to be exceptional. When present, it points to severe ulceration in the rectum. In acute tropical dysentery, however, tenesmus is a common symptom.

There is not infrequently considerable abdominal pain and tenderness. The pain is referred to the abdominal wall, but is not well localized. The tenderness is most marked in the left iliac fossa and in the left loin, but often extends over the whole colon.

The character of the stools varies considerably, but they are always thin, watery, and contain blood. Pus is seldom present in any large amount, but can always be detected on microscopical examination. There is always mucus, and often sloughs can be seen if the stools are carefully examined. They are usually very fœtid. The digestion is much disturbed, and nausea and vomiting may occur and cause considerable distress. Vomiting is, however, exceptional, except in the more acute cases, and, indeed, many patients suffering from chronic ulcerative colitis have surprisingly few symptoms apart from the diarrhœa and consequent loss of weight. I have even seen patients with the pelvic colon showing extensive and severe ulceration who were able to get about and who complained only of the constant diarrhœa.

The progress of the disease varies a good deal. Some patients get rapidly worse, go steadily downhill from the first, lose much weight, seem unable to digest anything, and in a few weeks become wasted skeletons. Others seem to go on for months, sometimes a little better, and sometimes worse. Others, again, after a severe attack lasting several weeks or months, get better and remain well for a time, only to have renewed attacks which, as a rule, are more severe.

The condition usually described is that in which the symptoms soon become serious, and the patient's life is threatened; but it is important to recognize that there are other types of chronic ulcerative colitis in which the symptoms are never very severe, and the patient is able to get about, though frequently troubled with diarrhœa. It has been stated that where the symptoms are comparatively mild the condition is not ulcerative colitis; but frequent examinations with the sigmoidoscope have convinced me that very extensive ulceration may, and often does, exist, though it seems probable that the ulceration is confined to the pelvic colon.

The temperature is commonly, though not invariably, raised. Except in the more severe cases it is not high, but varies between 100° and 101° F. The chart, if examined, usually shows a very irregular temperature, of the type we generally associate with chronic septic poisoning. I have seen several cases, however, in which, although there was severe diarrhœa and the sigmoidoscope showed extensive ulceration, the temperature never rose over 99° F. while the patient was under observation. These were,

however, all very chronic cases in which the symptoms had existed for months or years. All observers agree that relapses are very common in those cases which are not fatal. When death occurs, it is usually due to exhaustion and wasting; less frequently to perforation and general peritonitis; and in a few instances to hæmorrhage. At the present day the diagnosis should not be difficult, as the pelvic colon is always involved, and this can be directly examined with the sigmoidoscope. The instrument must, however, be used with great care, because the bowel wall is weak and friable. In experienced hands there is no risk in using the sigmoidoscope; but no one who is unaccustomed to the instrument should attempt an examination in suspected ulcerative colitis.

The disease can, as a rule, be diagnosed from the symptoms; but unless the sigmoidoscope is employed there are several conditions with which it can easily be confused. The most important of these is cancer of the pelvic colon or upper end of the rectum, which not infrequently gives rise to identical symptoms. Another is a high-lying fibrous stricture with secondary ulceration in the bowel above. The condition may also be confused with enteric fever, and with acute proctitis.

Acute tropical amœbic dysentery is not often met with in this country, and its symptoms and treatment are so well described in modern works on tropical medicine that it will not be discussed here. Cases of chronic dysentery are, however, not infrequently seen; but they differ in no important particular, either as regards symptoms or treatment, from chronic ulcerative colitis, except that when amœbæ can be demonstrated in the stools improvement often follows a course of special treatment by emetine injections. The spores of amœbæ should be carefully looked for in all chronic cases of ulcerative colitis, as it is known that the spores may survive for very many years in the bowel mucosa, and maintain a chronic ulceration which cannot be distinguished from ulcerative colitis.

The After-Results of Ulcerative Colitis.—In most cases the disease clears up and the mucous membrane heals with very little scarring. One of the worst features of the condition is its very marked tendency to recur, often after years have elapsed, during which the patient has been quite free from symptoms. Some slight cause, such as an attack of influenza, or a chill, will result in all the symptoms returning, often in a severe form. One of my patients, a man aged thirty-five, had very severe ulcerative colitis, and was ill for nearly a year, but made a complete recovery. He remained quite well for ten years, living an active life, and then returned with typical ulcerative colitis of a mild type, but with blood and mucus in the stools. On examination he was found to have three very septic teeth, and these were extracted. This procedure appeared to light up the condition, and he became so ill that a fatal issue seemed probable, but after a stormy period he completely recovered again. Whether it is that

there is some special susceptibility in these patients to infection of the bowel mucous membrane, or whether it is that the organisms remain in the deeper layers of the mucous membrane in a dormant condition, to light up the infection when the patient's general condition is lowered by some other infection, we do not know; but the tendency for the condition to constantly recur is a very marked feature of the disease. I have seen the same patients return with the old symptoms over and over again at intervals of years.

Stricture following Ulcerative Colitis.—Very severe stricture may result after a bad attack of ulcerative colitis, and should always be looked for



FIG. 184.—FIBROUS STRICTURE OF THE ASCENDING AND TRANSVERSE COLON DUE TO ULCERATIVE COLITIS (BARIUM ENEMA PHOTOGRAPH).

when a patient has had severe symptoms for a long time, which will not clear up under treatment. An examination with a barium enema will reveal the stricture, if present. The stricture may involve a considerable part of the colon, and there may be several strictures present (see Figs. 184, 185). In one case about 4 inches of the transverse colon was very tightly strictured, and there was another stricture in the descending colon. On examining photographs of the colon after a barium enema, it can often be seen that a large section of the colon shows no haustration, and that there is a ragged outline or a notched appearance in places. This indicates serious damage to the bowel wall. In addition, there may be areas of considerable narrowing or band-like strictures in various places. At

the discussion on ulcerative colitis which took place in 1931 at the Royal Society of Medicine, quite a number of cases of very severe stricture following ulcerative colitis were demonstrated. Several of these were multiple, and in five short-circuiting operations had been performed for obstruction.

Case.—A woman, aged twenty-six, had suffered for eight years. I suspected the possibility of a stricture because the patient had persistent diarrhœa, in spite of the fact that a sigmoidoscopic examination showed no signs of any ulceration. An X-ray examination revealed a long and narrow stricture in the transverse colon, and another in the



Fig 185.—Stricture of Transverse Colon and Descending Colon due to Ulcerative Colitis.

descending colon. I opened the abdomen and found the colon almost completely occluded for 4 inches on the right side of the transverse colon, and a severe stricture in the descending colon. There was dense cicatricial tissue, and it was obvious that nothing could be done with the damaged bowel. I therefore performed a lateral anastomosis between the ileum and the pelvic colon. The patient made a good recovery.

Case.—The other patient had only been ill for two and a half years, but had had a very serious attack. Both he and the previous patient had been treated by medical means only. An X-ray examination of this second patient showed a stricture in the splenic and descending portion of the colon. This patient was also treated by an ileo-sigmoidostomy, but several recurrences of the ulceration have occurred. Appendicostomy was also done, and he has been able to carry on, but has not been completely restored to health.

Multiple Polyps.—This has often been described as a complication of ulcerative colitis, and it has been supposed that the polyps are adenomata of the same type, as in cases of true multiple adenomatosis of the colon, which is a genetic disease. As I have on several occasions pointed out, these multiple polyps, which are seen in old cases of ulcerative colitis, are not true polyps at all, but small islands of normal mucous membrane left behind by the erosion of the ulcers. They closely resemble true

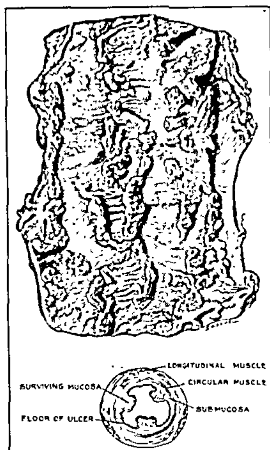


FIG. 186.—DRAWING OF COLON, SHOWING PATCHES OF NORMAL MUCOSA LEFT BETWEEN ULCERATED AREAS AND IMITATING POLYPI.
(*From a specimen in St Mark's Hospital Museum*)

adenomata, but they are not. There are a large number of specimens which prove this conclusively in the museum at St. Mark's Hospital, and Cuthbert Dukes has made very careful microscopic studies which show that these polyps are not adenomata.

Prognosis.—This is a very serious disease, and in the severe cases the prognosis is bad. At one time the mortality of ulcerative colitis was estimated to be as high as 80 per cent., and so far no statistics from general

hospital records have been published showing a mortality of less than 35 per cent. I believe that with proper treatment the mortality should not be more than 10 per cent. The worst cases are those in children and young adults. I have seen a number of cases in children, and have never seen a complete recovery. Most of the cases in children were rapidly fatal, in spite of treatment, or else they only lived for a year or two and then ended fatally. A very grave prognosis should, therefore, be given when the patient is a child, and the best chance is immediate appendicostomy. Children seem to be quite unable to stand the septic toxæmia from the large ulcerated surface. With the exception of children and young adults the prognosis in a case of ulcerative colitis is in our days quite good, provided that an appendicostomy is performed early, and that the patient's vitality has not already been too seriously lowered to allow of his throwing off the disease. After all, surgery does not cure a patient; it merely so alters the conditions as to allow the patient to master the disease. Operation merely assists nature, and if the patient's vitality is too seriously lowered it is not reasonable to expect recovery; even if the conditions are favourable, it is of the utmost importance that an appendicostomy opening should be established as soon as possible. Too frequently it is left as a last resort when everything else has been tried and failed. My experience of these cases is that the result is extremely good where the operation is done early, but that where the patient is very seriously ill before the operation is performed, although recovery sometimes takes place, it is always doubtful. I have seldom seen a patient die from ulcerative colitis where the operation is performed during the early stage of the disease. Even counting the cases which have come for operation late, the prognosis is on the whole good, and the vast majority of patients now recover.

Treatment.—Various attempts have been made to cure the disease by a direct attack upon the infecting organism, either by vaccines and serums, or by attempting to substitute some other organism which is antagonistic to the infecting agent. It is generally agreed by all authorities on the subject that very little can be done by the use of vaccines. I have personally never seen vaccines do any good. Hurst some years ago advocated the use of polyvalent antidysenteric serum in these cases, and several very encouraging results were published, and equally good results have been obtained by others with this serum. But in many cases it does no good. It seems probable that a certain percentage of cases of ulcerative colitis are really cases of chronic dysentery in which the diagnosis has been missed, and it may be that in such cases the serum has been successful. The doses advised by Hurst are 40, 60, 80, and 100 c.c. injected intravenously on successive days. The success or otherwise of the serum treatment depends upon the nature of the infecting agent. Antistreptococcic serum has also been used successfully in a few cases.

Treatment by the administration of the Bulgarian lactic acid bacillus, together with sugar, has been tried often, and in a few cases has given good results. This treatment seems to be most effectual when there is an appendicostomy opening, and the bacillus can be put straight into the colon.

Various substances have been used for washing out the colon. Hurst advises tannic acid, 1 to 2 grains to 1 ounce. Potassium permanganate (1 to 16,000) has also been used. Strong antiseptics must on no account be used, as they will be absorbed. A good solution is from ½ to 1 per cent. protargol. Bismuth subgallate (5 per cent.) suspension in olive oil is very useful; 8 ounces should be put in and retained, if possible (see p. 470).

In severe cases the best solution for washing the colon is a hypertonic salt solution, 2 drachms of salt to the pint. This tends to increase the flow of lymph from the ulcerated area and to stimulate granulation (see p. 469).

In any case where lavage of the colon is being used, whether through the anus or an appendicostomy opening, it is most important that the solution should be as nearly as possible at blood temperature, and should be introduced very slowly and without pressure, so that spasm is not set up in the colon. Careless lavage will cause spasm and pain. To do any good the lavage should be done two or three times a day. It is necessary to give drugs to allay spasm, and to save the patient the distress of constant fluid actions of the bowel. For this purpose belladonna and opium should be given as necessary by the mouth, or as a starch enema by the rectum. Kaolin in full doses by the mouth is useful in checking the diarrhœa, and in getting rid of the toxins.

The patient should be absolutely confined to bed in a warm room, and should not be allowed to get up for the purpose of relieving his bowels or for any other reason. He should be kept on a full nourishing diet, and fed at frequent intervals.

One of the commonest errors in treatment is that so often the patient is put upon a diet with insufficient nourishment. Ulcerative colitis is a very exhausting disease, and if recovery is to take place the patient must be well fed. As in the case of tubercle, he requires an increased amount of intake to make up for the increased loss. As a rule, the diet is reduced rather than increased. My experience has been that a full diet should be given. The difference between the residue of a mutton cutlet and a glass of milk by the time it reaches the colon is negligible as regards any effect upon the ulcerated surface. I am constantly seeing patients with ulcerative colitis who to all intents and purposes are being carefully starved. It is just as absurd to suppose that a patient with this disease can recover on a starvation diet, as that a patient with phthisis could do so. The improvement that results from feeding such patients on a full diet is spectacular. I can almost hear some of my medical colleagues saying: " How

ridiculous! A patient with ulcerative colitis cannot digest ordinary food." But why not? Digestion does not take place in the colon, and in these days there are many aids to digestion.

Some time ago I had sent up to me from the country a poor curate who was supposed to be dying from ulcerative colitis. He had had an appendicostomy performed, but was getting no better. He had been ill for eighteen months and weighed 5½ stones. I had not seen him until he arrived on a stretcher in the nursing home. I found he was reduced to skin and bone, but the sigmoidoscope revealed a normal colon with no ulceration at all. I found he had been fed on small quantities of milk and Benger's food, and the total quantity would not have kept two ordinary sized cats in health. I put him on a full diet gradually, with pepsin and pancreatin to assist his digestion, and in six weeks he put on 3 stones in weight, an average of ½ stone a week, and is now perfectly well.

My experience has been that about 40 per cent. of patients recover without operative interference. Suitable medication, dietary, and lavage of the colon, combined with serum injections and zinc ionization, prove sufficient to restore the mucous membrane to a normal condition. The patient is examined periodically with the sigmoidoscope and treatment continued until no signs of ulceration can be seen. Although I have seen very good results from the injection of antidysenteric serum in a few cases, it has completely failed to have any influence on the disease in the majority. The other 60 per cent. of cases have been treated by appendicostomy, either because they were very bad cases to begin with or because non-operative treatment had been given a fair trial and failed. It follows that all the more serious cases have been operated upon.

Operative Treatment.—Apparently the first instance of chronic ulcerative colitis treated by operation was a case of Hahn's in 1880. The patient was a prostitute, and it was at first supposed that the ulceration was due to syphilis, but as it did not improve under antisyphilitic treatment he performed colostomy. Previous to operation she was very ill, and had lost 68 pounds in weight, but she made a complete recovery. As the result of an attempt to close the artificial anus two years later, she died of pyæmia.

The first successful cæcostomy for ulcerative colitis seems to have been performed in Italy in 1887 by Novara.

Appendicostomy.—The operation of choice in cases of ulcerative colitis is, without doubt, appendicostomy, or, if this is impossible owing to the appendix being diseased or having already been removed, a valvular opening which will just admit a catheter should be established. At first the colon should be washed out twice daily with either plain water or hypertonic saline, a tube being placed through the anal sphincters to allow the fluid to run out.

This operation gives excellent results; the ulceration, as a rule, quickly heals, the patient puts on weight, and the diarrhœa is controlled. The patient can be washed out with far less disturbance and discomfort than by the rectum, and the fluid, as it is passing in the correct direction, does not set up spasm.

If the patient is not in any serious danger, it is as well to wait about a week *before opening the appendix and commencing irrigation*, as this will enable the wound in the abdomen to heal, and a better opening will be obtained. If the appendix is opened at once, sepsis of the wound is almost certain to result owing to infection from the inside of the colon.

If the patient is suffering from severe diarrhœa, however, the catheter should be passed into the appendix at once and the bowel irrigated.

In most cases it is sufficient to irrigate the colon twice a day. For this purpose the patient is placed on a bed-pan, and a short rectal tube is passed into the rectum.

The best fluid to use is a hypertonic salt solution, 2 drachms to the pint. It is most important that this solution should enter the cæcum at blood temperature. Allowing about 2° F. for cooling in the apparatus, this means the solution should be at a temperature of 100°. This must be carefully checked with the thermometer, and on no account should it be guessed at.

One or two quarts of fluid should be run in at a time, and it should usually be sufficient to do this twice a day. Should the patient be very bad it may be done every four hours, or even run through continuously. In the latter case the patient must be put on a metal bed-pan, which is properly padded, and to which there is a tap attached to a piece of rubber tube with a wide bore brought out at the side of the bed into a bucket. The fluid must be allowed to run in from some form of irrigator which will keep the temperature at a constant level, and, of course, it must be carefully watched by the nurse to see that the patient is kept dry and that the fluid is run in correctly. The rate of flow should be about 2 pints an hour. But should this rate of flow cause distress, it may be reduced.

A great variety of solutions have been used for irrigating the colon. There is, however, no great advantage in using antiseptics; the main object is to have a solution which will cleanse the bowel and be as unirritating as possible. There seems to be a distinct advantage in using a hypertonic solution—that is to say, one the specific gravity of which is higher than that of the blood—probably owing to the fact that the osmosis is from the colon and not towards it. Lately I have been using sea salt, 2 drachms to the pint, and believe this gives the best result of any solution I have yet used.

Kaolin, or "Balus Alba."—This substance has been used in some cases of ulcerative colitis with much success. Kaolin is a very fine powdered

clay which forms a mixture with water. It was first introduced from China as a cure for cholera, in which disease it is claimed that it has enormously reduced the mortality. When there is constant diarrhœa kaolin is most effectual in stopping it. It should be used to irrigate the bowel in large quantities, being mixed with water at the correct temperature in amounts which will just allow the mixture to flow through the tube. It is quite non-toxic and non-irritating.

I have seen very good results in some cases from washing out the colon with sour milk in solution with sugar.

The best solution that I have yet tried is one which I have been using lately, and consists of bismuth subgallate (5 per cent.) in suspension in olive oil. The bismuth must be a suspension and not an emulsion. It must be put in with a syringe, as the oil flows too slowly through the catheter to go in by gravity. It should be put in at bedtime, using about 8 ounces, and, if possible, retained all night. To secure this the patient should be given belladonna and morphia, or a hypodermic of morphia three quarters of an hour before administering the bismuth.

The object of this treatment is to coat the inside walls of the colon with bismuth. This can be checked by examining the patient under X rays, when it will be seen if the treatment is working properly that the walls are everywhere coated with bismuth. I have seen most spectacular results from this solution, the diarrhœa being checked within twenty-four hours. If the olive oil is too expensive, cotton-seed oil can be substituted for it.

As a rule, after an appendicostomy has been performed, the patient immediately begins to improve, the temperature comes down, the diarrhœa quickly checks, and the ulceration in the rectum can be seen with the sigmoidoscope to be healing. In many cases the patient is quite convalescent in three weeks. The opening should always be kept open for at least a year, as recurrences are common, and it is advisable not to close it until the patient has been quite free of all symptoms for six or eight months.

Of 130 cases treated: 51 were treated without operation; 79 were treated by appendicostomy.

Of the 51 cases: 27 were definitely cured; 23 were improved and ceased to attend, but cannot be claimed as cures, as they were not examined after they said they were well; 1 died.

Of the 79 cases treated by appendicostomy: 59 were definitely cured; 12 died; 8 improved.

The total mortality therefore was only 10 per cent.

Other Operations.—Cæcostomy has several times been performed for the relief of ulcerative colitis. But although, by giving rest to the colon, it often enables the patient to recover, it is most objectionable owing to the constant liquid stools, and it may prove impossible to close the opening later,

as the colon is particularly liable to stricture when a cæcostomy is present. It is not likely that cæcostomy will cure the patient if appendicostomy fails to do so.

Two other methods suggest themselves—namely, to short-circuit the colon by ileo-sigmoidostomy, and to excise the diseased colon. Neither of these is, however, possible except in most exceptional cases. The rectum and sigmoid are generally the parts of the bowel in which there is most ulceration, and therefore the anastomosis would have to be done with diseased bowel. For the same reason excision would not be possible, even if the patients were not too ill to stand so severe an operation.

Distension or Stercoral Ulcers.

These are commonly found above a stricture of the colon or rectum. The most common situation is in the dilated portion of bowel immediately above the stricture, but they may occur in any part of the colon above the stricture; thus the stricture may be in the rectum and the ulcer in the cæcum. They are usually multiple, discrete ulcers with well-marked edges. They do not differ in any important particular as regards their morbid appearance from the form of ulceration already described. They apparently arise as the result of the local irritation and inflammation caused by retained fæcal material above the stricture. In fact, they may be said to be traumatic in origin. They are seen in cases of fæcal impaction when there is no stricture, and may occur as the result of chronic constipation alone. I have seen one such case in which several stercoral ulcers were present in the sigmoid flexure (see Fig. 187) of an old woman who for years had suffered from chronic constipation. They are for the most part quite shallow, and involve only the mucous membrane; but when they occur above a stricture they may in time expose the peritoneum, and perforate or give rise to local abscess formation.

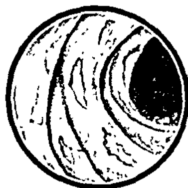


Fig. 187.—Ulcers in the Sigmoid Flexure in a Case of Chronic Constipation

Simple Perforating Ulcer of the Colon.

There are a few rare cases in which a patient has developed acute general peritonitis, and either at the time of operation or post-mortem a single simple ulcer in the colon has been discovered which had perforated into the peritoneal cavity.

These cases do not appear to belong to the same class as those of ulcera-

tive colitis which have previously been described, and I have therefore placed them separately, though it may subsequently transpire that they should not be so divided.

They bear a close resemblance to perforating duodenal and gastric ulcers. They are distinguished from ordinary ulcerative colitis in that there is only a single ulcer, or at most two, the remainder of the colon being healthy, and that there are none of the usual symptoms of ulcerative colitis; in fact, in many there do not appear to have been any definite symptoms until the sudden onset of general peritonitis.

In one case the patient, a man who was not known to have suffered from any bowel trouble, was operated upon for a stone in the bladder; he died three days after the operation, and post-mortem there was found general peritonitis due to a simple ulcer in the splenic angle of the colon which had perforated.

In a case of Quénu's the patient, who was suffering from acute pneumonia, developed acute abdominal pain on the fourteenth day of the illness, and died with symptoms of general peritonitis. Post-mortem there was a single ulcer in the descending colon which had perforated, and also an ulcer in the stomach. In several there was a stricture or obstruction in the colon below the situation of the ulcer. In one a volvulus of the sigmoid flexure had been operated upon and untwisted three days before an ulcer in the cæcum perforated.

In another case reported by Quénu the patient died after an illness lasting seventeen days, with symptoms of perforation and peritonitis. Post-mortem there was a single ulcer about 1 inch in diameter in the transverse colon which had perforated; there was also an ulcer in the stomach. In one case there was a simple ulcer the size of a shilling in the sigmoid flexure, which had perforated and caused an abscess; the patient died from pyæmia.

I have been able to find records of nineteen such cases in which there was either a single ulcer in the colon or two small ulcers close together, the remainder of the colon being quite free from ulceration. All but two were men, and their ages varied between twenty-seven and sixty-seven.

The situation of the ulcer is shown in the following table:

	Cases.
Sigmoid flexure	7
Ascending colon or hepatic flexure	4
Descending colon or splenic flexure	5
Transverse colon	1
Cæcum	2

In three cases an obstruction existed below the ulcer. In one the ulcer was tuberculous, and one was due to typhoid fever. One patient was suffering from acute pneumonia; but there is not positive evidence that

the ulcer was caused by the pneumococcus. In the remaining cases there was present no apparent cause for the ulcer, and no other lesion of the colon. In most there was a history of constipation, but otherwise no trace of any bowel trouble until the sudden onset of symptoms of perforation. In one or two there was a history of localized pain and tenderness in the abdomen over the situation of the ulcer for a few weeks.

In a case reported by Bradbury there was no apparent perforation. The patient was a man, aged thirty, who died after an illness which commenced with sudden pain in the abdomen. Post-mortem there was a single small ulcer of the cæcum which had not perforated. The appendix and the rest of the colon and small bowel were quite healthy. There were multiple abscesses of the liver and a right-sided empyema.

In two of the cases there was an ulcer in the stomach in addition to that in the colon. This is particularly interesting in view of the close resemblance which these ulcers of the colon bear to gastric ulcers. In three the lesion was undoubtedly a distension or stercoral ulcer occurring above a stricture or obstruction, and it seems possible that in many of the others *the ulcer was of a traumatic nature, and caused by the retention for long* periods of hardened fæcal masses.

In addition to the forms of perforating ulcer of the colon already mentioned, there are two others of importance. *Typhoid ulceration* of the colon is not common, but I have been able to collect seven cases in which a typhoid ulcer of the colon perforated and caused fatal peritonitis. In one case the ulcer was in the ascending colon, in two in the hepatic flexure, in two in the cæcum, and in two in the sigmoid flexure. *Tuberculous ulceration* of the colon may also result in perforation.

Charbonnel records six cases of simple ulcers of the cæcum or colon for which no local or general cause could be found. He attributes their occurrence partly to infection from fæcal stasis and partly to circulatory disturbances in the cæcum. The ulcer has a punched-out appearance, with its margins slightly, if at all, indurated. It is usually single, but is sometimes accompanied by one to three smaller perforations situated on the anterior surface of the cæcum and colon.

Treatment of Complications.—Of these there are three which are likely to call for surgical treatment: (1) *Perforation*; (2) *hæmorrhage*; (3) *abscess*.

1. *Perforation.*—With very few exceptions this complication is fatal, unless an operation can be performed in time; and only immediate intervention can save the patient's life.

The success which has attended the treatment by operation of perforated gastric ulcer and perforation of the appendix can certainly be repeated in dealing with these cases of perforating ulcer of the colon, once the condition becomes sufficiently well recognized for an early diagnosis to be made, and providing the surgeon is able to operate soon after

the perforation has taken place. Unfortunately, up to the present this has seldom been the case; the perforation has either not been diagnosed during life or the surgeon has been called in too late for there to be any reasonable chance of doing good.

A correct diagnosis is very difficult in these cases, and it will seldom be possible for the clinician to do more than diagnose a probable perforation in some part of the intestine. Unless the surgeon bears in mind the possibility of a perforating ulcer of the colon when he comes to operate, and carefully examines the colon after having excluded a perforated appendix or gastric ulcer, the perforation will probably be missed. This occurred in one case where perforation and general peritonitis were diagnosed and the abdomen opened; a slightly inflamed appendix was removed, but the cause of the peritonitis, which was a perforation of the colon at the hepatic flexure, was missed, and the patient died. The difficulty of finding and closing the perforation may be considerable; it may be in any portion of the colon and on any aspect. Moreover, there may be more than one perforation in the same case.

The method of dealing with the perforation will vary with the nature of the case. It may be treated like a perforation of the stomach and closed by a purse-string suture reinforced by a row of Lembert sutures. Another method is to resect the ulcer and close the wound in the bowel in the opposite direction, so as not to narrow the lumen; or, if the ulcer is large, to resect a few inches of the colon and unite the ends.

I have been able to collect forty-two cases of perforation of the colon due to simple ulceration. This does not include any cases of perforating false diverticula. All died, with the exception of three. Only six were operated upon, but of these three recovered. Thus, without operation the mortality would appear to be 100 per cent., and there is no doubt that this mortality can be greatly reduced by operation.

Of the six cases operated upon, the ulcer was missed in the three that died. One was treated by closing the perforation, and recovered. In one an abscess was opened and a fæcal fistula found; later, the portion of colon (sigmoid flexure) containing the ulcer was successfully resected.

In the third case that recovered the operation consisted only of opening an abscess. In another enterotomy was performed, but the patient died, and post-mortem a perforating ulcer in the sigmoid was discovered.

2. *Hæmorrhage.*—With the exception of hæmorrhagic colitis, severe bleeding in cases of ulcerative colitis is not usual. An exception, however, occurs when perforation into a small artery takes place at the bottom of one or more of the ulcers. This may happen in severe cases when the sloughs separate, or at any time during the acute stage in just the same way as hæmorrhage occurs in the later stages of a typhoid ulceration of the small intestine.

The hæmorrhage may be very severe, and the entire large intestine may be filled with blood-clot.

The best way of treating such a case is to immediately give morphia or some form of opium in sufficient quantity to bring down the pressure and keep the patient quite quiet. At the same time the large bowel may be washed out with a kaolin solution, or with astringents such as hazeline, 2 ounces to the pint; or liquor ferri perchlor., 2 drachms to the pint. The administration of hæmoplastin or coagulin ciba, which are preparations of hæmokinase, should also be given hypodermically. If the hæmorrhage has stopped and the patient is in danger, he may be transfused with human blood.

3. *Abscess.*—The presence of an abscess may be suspected when the temperature runs up and swings through several degrees each day. Examination of the blood for leucocytosis will also assist in the diagnosis. The usual signs of tenderness, redness, etc., will be present if the abscess is near the abdominal wall. When an abscess forms it is generally outside the bowel, and communicates by a narrow opening. In some cases quite large quantities of pus are passed in the stools occasionally, due to the abscess draining into the bowel.

When an abscess has been diagnosed, the first thing to do is to try and ascertain its situation, and if this can be done with any degree of accuracy an attempt should be made to drain it.

CHAPTER XXVIII

DIVERTICULITIS

DIVERTICULITIS is the condition caused by inflammation of the colon wall or surrounding structures due to inflammatory changes in a pouch or diverticulum of the colon. Diverticula, or local pouching of the mucous membrane of the bowel, may be found in any part of the alimentary tract. Diverticula have been observed in every part of the intestinal canal from the œsophagus to the lower end of the sigmoid flexure of the colon. They do not, however, occur in the rectum. They are far more commonly met with in the large bowel than elsewhere, and their importance depends almost entirely upon the part of the alimentary tract affected. In the small bowel they cause, as a rule, no trouble, and are only discovered accidentally. It is only in the large intestine that they are of any serious clinical importance. The reason for this is that it is the nature of their contents which decides whether they give rise to trouble or not. In the small intestine and cæcum they contain only fluid, while in the lower part of the colon the contents, being solid or semi-solid, tend to be retained, and to set up secondary changes in the walls of the diverticulum. It is important to realize that the diverticula themselves are not harmful; it is the fact that they retain solid material which is the cause of the trouble.

Diverticula are also found in the appendix, but they do not apparently cause pathological changes in this situation. In the colon, however, they usually cause very serious results. It also happens that this is the situation where they most frequently occur.

It is only of comparatively recent years that diverticulitis has been recognized as a definite form of disease, though many observers had previously recorded cases of abscess or inflammatory tumours in connection with the colon. In looking up old records one not infrequently meets with cases which were obviously of this nature, but, as with appendicitis before it became a well-recognized condition, little attention was paid to them, and in very few instances were really careful observations made. The cases were classed as inflammation of the bowels, post-peritoneal or intraperitoneal abscess, general peritonitis, etc., without any distinction being made as to the causation or pathology. Isolated specimens are to be found in museums, but in many instances they are wrongly described or classified, and in not a few the specimen is labelled " Cancer of the colon."

Lately more attention has been paid to this disease, and carefully

observed cases have been recorded. Even at the present time, however, diverticulitis does not find a place in most of the ordinary medical textbooks, and many medical men know nothing about it, or look upon it only as a rare pathological condition of little interest except to the pathologist.

Diverticulitis is not a rare condition, but, on the other hand, it is one which occurs comparatively often, and now that its symptoms and pathology are well known and recognized, it will be found to be a by no means uncommon disease of the alimentary tract.

Etiology.—A great deal of interest and much speculation has centred round the etiology of multiple diverticula of the colon and the exact nature of the factors which eventually lead to their formation. Congenital diverticula of the alimentary tract have been known and described for very many years, and their origin is not in doubt, but no one, I think, now believes that these diverticula of the colon which set up diverticulitis are congenital in origin. I shall not stress the various arguments against their congenital origin; two will be sufficient. The fact that multiple diverticula practically only occur after middle age is one very strong argument, and the other is that since cases have been watched with X rays over long periods, it has become quite obvious that the condition is often, if not always, progressive, and that in course of time diverticula can be seen to develop in areas of the colon which were previously free.

There is always considerable difficulty in making an exact study of the earliest stages of any disease, owing largely to the difficulty of obtaining suitable material. While plenty of specimens of fully developed diverticulitis existed there were, until recently, none of the early stages. With the assistance of Cuthbert Dukes, who very carefully investigated a large number of specimens, we have been fortunate enough to find evidence of the very earliest stages. Before this our knowledge of the early stages of the development of diverticula was confined to the evidence of X-ray photographs, which not infrequently showed a curious appearance of the colon wall as apparently a definite precursor of diverticulitis. The colon wall in these photographs appeared to be more fixed and immobile than normal, and showed a curious irregular outline. This condition is well shown in Fig. 188. E. I. Spriggs, who was one of the first to describe the appearances, called it " palisading "; he and his associates concluded that the appearances were due to a chronic inflammatory condition of the colon wall, and they further argued that this inflammatory condition gave rise to the formation of diverticula. In other words, acquired diverticula were, they held, the result of a pre-existing inflammatory condition of the bowel wall. The evidence that I have obtained by a study of the early changes in the colon wall itself completely negatives this view, and

shows that the development of multiple diverticula is the primary stage and is unaccompanied by any inflammatory condition.

A comparison of the two pictures shown in Figs. 189 and 188 makes it evident that the curious X-ray appearance called "palisading" shown in Fig. 188 is what one would expect from bowel in the condition shown in Fig. 189, and that this appearance is not due to any inflammatory condition of the colon wall, but to the formation of numerous small diverticula of the mucosa of the colon into the muscular coat.



FIG. 188.—RADIOGRAM, SHOWING THE WALL OF THE COLON IN THE EARLY STAGE OF DIVERTICULA FORMATION.

It is somewhat remarkable that there appear to be no records of the condition in children, although intestinal complaints are common enough in infancy.

TABLE OF 400 CASES OF DIVERTICULITIS, SHOWING AGE AND SEX INCIDENCE.

Age.	*Males.*	*Females.*	*Total.*
10–19	1	0	1
20–29	0	1	1
30–39	8	9	17
40–49	40	21	61
50–59	75	44	119
60–69	88	44	132
70–79	34	22	56
80–89	11	2	13
	257	143	400

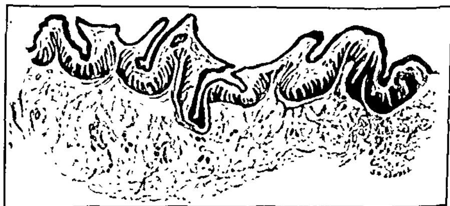


FIG. 189.—MICROSCOPICAL SECTION OF THE WALL OF THE COLON IN THE EARLY STAGE OF DIVERTICULA FORMATION, SHOWING IRREGULAR OUTLINE AND ABSENCE OF INFLAMMATION.

The portion of the colon most commonly attacked in diverticulitis is the sigmoid flexure, but any part may be affected. In the great majority

of cases the condition occurs either in the sigmoid flexure or lower part of the descending colon. In a few the splenic angle has been the site of the disease. The condition may affect the whole colon, as in the case which is illustrated in Fig. 190.

I have seen diverticulitis in every part of the colon, but it appears to be most rare in the cæcal region In some cases the entire colon is affected with diverticulosis, but it is uncommon to find diverticulitis in more than one part. I had one case in which there was well-marked inflammation with tumour formation in the pelvic colon, and X rays showed diverticula



Fig. 190 – Diverticulosis of the Colon
(Photograph by Dr Harrison Orton)

to be present also in the transverse colon. This patient subsequently developed an acute perforation which was found to be due to the giving way of one of the diverticula in the transverse colon, but such cases are rare. Very large diverticula of the colon are occasionally seen, which are certainly congenital in origin, but there is no doubt that the diverticula usually found in the colon are acquired, and have no developmental origin.

The theory of their origin which is most widely held, and which seems to the author to be the most reasonable, is that they are pressure or

pulsion diverticula due probably to the pressure of gas in the large bowel, associated with a weakness of the muscular or elastic walls.

In favour of this is the undoubted fact that they are a condition of late life. This would seem to support the view that some degeneration of the bowel wall is a causal factor.

In favour of the pressure theory is the fact that they are sometimes seen in the bowel wall above a stricture. Such a case was shown at the meeting on diverticulitis at the Royal Society of Medicine in 1919 by Grey Turner. The specimen showed a cancerous stricture of the sigmoid with diverticula of the colon above it. I have seen another case in which a large diverticulum was present in the upper part of the sigmoid above a rectal stricture (carcinoma).

Multiple diverticula of the colon are often found in persons over forty years of age quite unassociated with any inflammatory manifestations. Obviously this condition cannot well be called diverticulitis, since there is no inflammatory process present, and it has been generally agreed to call it diverticulosis.

These diverticula vary in size from minute canals, which can hardly be detected except by microscopic examination of cut sections, to large elongated pouches resembling the vermiform appendix or a Meckel's diverticulum.

They are sometimes round, and may be described as resembling cherries, but more often are long finger-like pouches with a somewhat dilated extremity. In one of my cases the largest diverticulum was about 2½ inches in length, and about the thickness of a normal appendix vermiformis. It passed down between the layers of the mesosigmoid, and the opening from the bowel, which was at the mesenteric attachment of the sigmoid, easily admitted a large-sized probe. In many cases, however, they are much shorter than this, and will admit only a bristle with difficulty.

The commonest situation for diverticula is along the edges of the longitudinal muscle bands; but they may occur at any position between these bands. They may be found on the free edge of the bowel almost opposite the mesenteric attachment. It is not uncommon to find one of them passing into an appendix epiploica, and several writers have concluded that these diverticula are simply hollow appendices epiploicæ which communicate with the bowel lumen. This is certainly not the case, as the normal appendices epiploicæ are simply small accumulations of the subperitoneal fat or subperitoneal lipomata, and have no connection whatever with the muscular coat of the bowel, and certainly not with the mucous membrane. The diverticula, on the other hand, are direct protrusions from the bowel lumen, and the fact that they may sometimes be found passing into an appendix epiploica must, I think, be looked upon as merely a fortuitous circumstance.

They occur at just the positions where the appendices are commonly found, and it is probable that in seeking a line of least resistance in which to extend their growth they readily find their way into one. In point of fact, they are frequently found to lead into the appendices, and they then become distended into a bulbous end which remains connected to the bowel lumen by a narrow channel. Not infrequently they push down between the layers of the mesosigmoid, and may then reach a considerable length.

These diverticula are true protrusions of the bowel; and at first, and before secondary changes have occurred in them, all the coats of the colon are represented in their walls, except occasionally the muscular coat. Presumably, when the muscular coat is not represented, the pouching has occurred between the fasciculi of the muscle, and thus has not carried the muscular coat with it. In a considerable number, however, the muscular coat can be demonstrated in the wall of the diverticulum. As it enlarges and as secondary inflammatory changes occur in its walls any muscular tissue atrophies, so that in the later stages no trace of any muscular tissue can be detected.

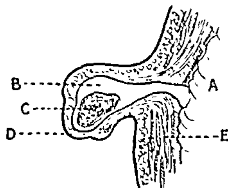


FIG. 101 DIAGRAM OF A DIVERTICULUM OF THE COLON

A, Interior of colon, B, cavity of diverticulum, C, stercolith; D, appendix epiploica; E, muscular coat of colon.

The diverticula are always lined by mucous membrane, though this may be much changed from secondary inflammation and may have entirely disappeared. There is usually a thick layer of fibrous tissue in their walls, due mostly to inflammation. Outside they are covered by peritoneum, and if they have passed into an appendix there may be a layer of fat.

The number of diverticula present in any particular case varies very considerably. While in some cases only a few may be present which can easily be counted, in others the pelvic colon may be so covered with them that it is almost impossible to distinguish which is the actual bowel wall.

The late Hamilton Drummond examined 500 post-mortem cases for the presence of diverticula in the colon, and found them to be present in twenty-two cases, or 4·25 per cent. In several of the cases he found diverticula were present in some of the hollow viscera, notably the small intestine and bladder.

Fifield found 218 cases of diverticulitis in 10,167 post-mortem examina-

tions, or 2·14 per cent. Post-mortem figures tend to give a very false estimate, unless the age of the patient is taken into consideration, for diverticula do not occur in persons under forty years of age.

Acquired diverticula of the colon generally contain fæcal material—in fact, one might say that they invariably do—and it is to their contents rather than to themselves that they owe their pathological significance. In many cases the fæcal material has become hardened from long residence within the pouch, and has formed a concretion or stercolith. In one of my cases the concretion was of the size and consistence of a walnut. They are generally found in the pouched extremity of the diverticulum.

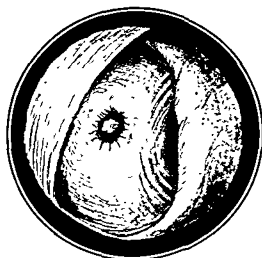


Fig. 192.—The Appearances as seen by a Sigmoidoscope of a Large Diverticulum in the Pelvic Colon containing a Fæcolith as large as a Walnut.

As has been stated, the diverticula usually contain solid fæcal masses, and it is due to the presence of these concretions that they cause trouble. Not infrequently the fæcal contents have become so hardened as to form actual calculi of a whitish appearance.

The actual opening into the lumen of the bowel is, as a rule, a narrow slit or pin-hole, and it is exceptional to find a large opening.

There is good evidence that the diverticula start at those points where the bloodvessels perforate the muscular coat of the colon. These points represent weak places in the coat of the bowel in the same way that the exit of the spermatic cord from the abdomen represents a weak place and results in hernia.

It seems to me most probable that diverticula start as true pulsion herniæ of the mucous membrane through the ridges in the circular muscle coat at the weak points where the bloodvessels enter, and that after their formation a retained fæcal content is likely to set up inflammation which spreads to the neighbouring tissues. This secondary inflammation may never occur, or it may take place at almost any stage in the development of the pouches. The nature of the process which starts the condition is at present only conjecturable, but it seems probable that some degeneration of the bowel wall, probably from age and unnatural conditions of the bowel function, is the initial factor. In favour of this view is the fact that the condition is practically confined to the second half of life, and that diver-

ticula of the colon are most frequently seen in fat persons. I have seldom seen a thin individual with diverticulitis. The rapid deposit of fat is generally a sign of poor metabolism, and is usually accompanied by a marked degeneration of the musculature. It is probably this degeneration of the muscular wall of the bowel which explains the common association of excessive fat and the development of diverticula in the colon.

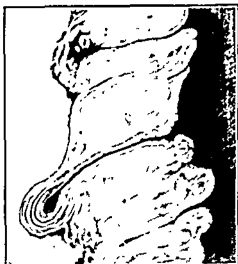


Fig 193.—Section of the Wall of the Colon in a Case of Diverticulitis due to Multiple Diverticula.

The Relation of Diverticula to Inflammation.—The earliest stage in the development of diverticula that I have observed is a condition in which there are large numbers of small millet-seed projections on the outside of the colon. These are arranged in rows, mostly along the edges of the longitudinal muscle bands, and tend to occur at the points where the lymphatics and blood-vessels perforate the muscular coat. This was first pointed out in 1920 by the late Mr. Hamilton Drummond. I have observed this millet-seed condition in several cases when the abdomen has been opened for some other condition, and am satisfied that there is, as a rule, no inflammation of the bowel wall accompanying it. In one case I observed very active inflammation of the colon wall around these millet-seed diverticula; some 6 or 7 inches of the bowel were greatly thickened and quite stiff from the inflammation, which involved nearly the whole wall of the bowel, and was most intense round the diverticula. It was quite clear in this case that the inflammation was secondary to the formation of the diverticula, and was the very earliest stage of an extensive diverticulitis. Fig. 189 shows (very much magnified) the appearance in cross-section of the colon wall in a very early stage of multiple diverticula. It will be seen that several diverticula are pushing their way into and

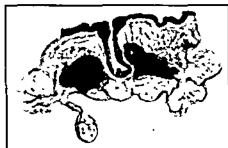


Fig 194 —Microscopical Section of a Very Early Diverticulum, showing a Foreign Body and Abscess Formation around the End in the Subserous Layer

through the muscular coat of the bowel. Apart from this pouching of the mucous membrane the bowel wall is normal and shows no inflammatory changes. In Fig. 194, on the other hand, a very small diverticulum is shown which contains a foreign body, and an abscess can be seen forming around the extremity of the diverticulum.

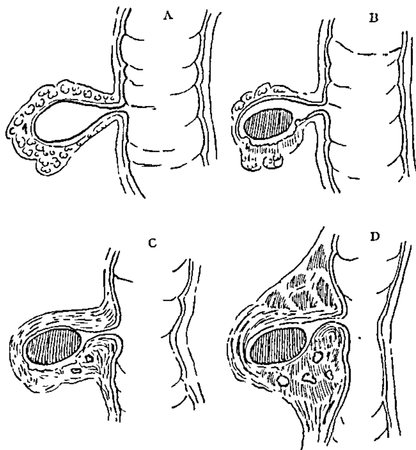


FIG. 195.—DIAGRAM TO SHOW THE METHOD OF FORMATION OF DIVERTICULITIS.
A, Showing a diverticulum in an appendix epiploica, a harmless condition of diverticulosis. B, Next state, in which a concretion has formed and ulceration and thickening of the wall of the diverticulum is beginning to occur. C, Further state, with much thickening and secondary abscesses and commencing stricture from contraction of fibrous tissue in colon wall. At this stage all mucous membrane in the diverticulum has disappeared. D, Late stage, with dense thickening, and considerable stricture of colon lumen, secondary abscesses, and adhesions to surrounding structures. This is the stage of tumour formation.

Once a diverticulum has formed, and fæces have found their way into it, the tendency is for it to get gradually larger. The pressure of hardened fæcal material within the sac very soon sets up a chronic inflammation of some part of the sac wall, in the same way that stercoral ulceration takes place above a stricture of the rectum. Very soon an ulcer forms at the spot where the fæcal concretion rests on the wall of the sac; then several things may occur.

The ulcer may perforate the wall of the sac and set up an abscess localized to the tissue outside the sac. The abscess will gradually enlarge until it bursts into the bowel or the peritoneal cavity, or on to the surface of the abdominal wall.

It may become adherent to the bladder and burst into that viscus, causing a colo-vesical fistula.

Or, as the result of some sudden increase in pressure, the ulcer may burst suddenly into the peritoneal cavity, and the resulting escape of material from the bowel lumen will then cause a general peritonitis.

More commonly the inflammatory condition is very chronic and accompanied by the deposit of fibrous tissue and adhesions in the neighbourhood



FIG. 196.—RADIOGRAM OF BARIUM ENEMA, SHOWING DIVERTICULA ALL ALONG THE COLON, TAKEN AFTER EVACUATION OF THE BARIUM FROM THE BOWEL.

of the diverticulum, resulting in the formation of a considerable tumour composed of dense fibrous tissue intersected by small abscess and diverticula containing concretions of fæcal material (see Fig. 195, D). Naturally, considerable adhesion to surrounding and continguous viscera will also occur. This condition usually takes place in several diverticula at once, and the process is very slow, probably taking several years. As the result of the increasing mass of fibrous tissue and the contraction which occurs in such tissue, the bowel lumen will in time be seriously interfered with, and a chronic obstruction will occur.

The type of stricture which results from diverticulitis is in some ways peculiar. The stricture is generally of the tubular type, and *quite smooth on the lumen side; its wall consists of dense fibrous tissue*, almost of the

consistency of cartilage, and often of considerable thickness. If an ulcerated surface is present it will be in the bowel above the stricture, and due to stercoral ulceration. There is no ulceration at the side of the stricture and no irregularity of surface, as in cancer.

There appear to be two very different and distinct types of case commonly seen. In the first the colon wall becomes inflamed over a fairly wide area at a very early stage in the development of the diverticula, as seen in Fig. 194. This results in course of time in very dense and progressive thickening and fibrosis of the colon wall in the affected area. Ultimately a firm fibrous stricture develops, with greatly thickened walls and firm adhesions to surrounding structures. This type of case from a clinical point of view closely resembles carcinoma of the colon, and is not infrequently mistaken for it. X-ray photographs fail to show the condition well, as the narrowed pouches do not readily fill with barium solution. This type of case can only be treated satisfactorily by resection of the damaged area of colon, or by establishing a colostomy opening above the obstruction.

In the second type of case the inflammation has started in one or two diverticula, and the stricture is due to adhesions and the presence of surrounding inflammation rather than to fibrous thickening of the colon wall.

In old-standing cases of diverticulitis further changes may occur as the result of chronic ulceration. In not a few instances cancer supervenes and spreads rapidly along the adhesions. I have in two instances seen this occur in cases where the diverticulitis had been demonstrated at an operation some years previously, and at which time no cancer was present. The cases which seem most liable to be complicated by cancer are those in which there is chronic sepsis, as evidenced by high temperature and the formation of abscesses.

Perforation may result either from sloughing of the concretion through the walls of the diverticulum (and in one or two cases the concretion has been found loose in the peritoneal cavity), from gangrene of the diverticulum, or from the formation of a local abscess which has subsequently burst into the peritoneal cavity. Examples of all these conditions are to be met with.

Occasionally a chronic diverticulitis is set up which results in the formation of a dense mass of fibrous tissue around the diverticula, protecting them from perforating, but causing a dense cicatricial mass which may result in obstruction of the bowel, and which may closely simulate malignant disease. Apart from the presence of concretions, diverticula may contain foreign bodies, and two cases are recorded by Bland-Sutton of an inflamed diverticulum of the sigmoid which contained a piece of straw. In one of the cases a diverticulum of the cæcum had become infected with tubercle, and caused tuberculous ulceration of the ascending colon.

Symptoms of Diverticulitis.—These vary greatly, according to the cause of the condition and the degree of inflammation present. From a clinical point of view we may distinguish two distinct types: cases in which there is tumour formation, and those in which there is abscess. Thus in many patients the condition first draws attention to itself by the presence of a tumour in the abdomen, in others by signs of an intra-abdominal abscess or by perforation and general peritonitis, while in a few the onset of intestinal obstruction is the first evidence of anything being wrong.

The commonest symptom is pain and tenderness in the left iliac fossa, the next commonest is irritability of the urinary tract and increasing constipation.

Interest has chiefly centred round those cases in which a tumour forms in some part of the colon, as these tumours so closely simulate cancer of the bowel that they are usually mistaken for it. It is interesting in this connection to notice that many cases of supposed spontaneous disappearance or cure without operation of cancer of the bowel are, without doubt, in reality diverticulitis in which the tumour has been mistaken for cancer.

The tumour, which is usually irregular in outline, tends to be sausage-shaped, owing to the fact that it involves quite a considerable length of colon. It is generally fixed, very rarely movable, and the common situation is deep in the left iliac fossa. Pressure over the tumour generally elicits pain and tenderness, and in this respect it differs from cancer of the sigmoid, which is not markedly tender. In some cases there is very marked tenderness all over the left iliac fossa, accompanied by a distinct and definite tumour.

Pain is usually variable, and often absent. A characteristic form of pain associated with diverticulitis is that in which pain is brought on by jolting, such as riding on horseback, or in a motor-car or train. This has led to diverticulitis being confused with kidney disease. Pain so caused is often accompanied by slight fever, and may even be accompanied by shivering and rigors. A characteristic symptom in many cases is a slightly raised temperature at night. The temperature seldom goes over 100°, and is generally about 99°, but it is often continuous for many weeks at a time.

When there are adhesions to the bladder, signs of irritability of the bladder, such as frequent micturition, may be present. In such cases perforation later into the bladder is not unusual. In women it is not likely that the bladder will be involved, as the uterus and broad ligament intervene.

In the more acute cases, where there is abscess formation, the symptoms are exactly the same as those of appendicitis, except that the situation is different. Several of these have been described as appendicitis on the

left side of the abdomen. There is a high or intermittent temperature, with rigors and sweats; pain, localized to some part of the colon; and local peritonitis. A tender swelling may be present, and there may be fluctuation on careful palpation. The abdominal wall is rigid, and the patient lies with the legs drawn up and in considerable pain. If perforation has occurred, the usual symptoms of commencing general peritonitis will show themselves. An exact diagnosis is seldom possible, but when we see a patient with all the symptoms of appendicitis, but with the signs localized to some other part of the abdomen than the appendix region, we should be suspicious of this condition.

It need hardly be pointed out that an X-ray examination is not a safe procedure when there are acute symptoms.

Case.—The patient was a lady, aged sixty-five, who for some two years had suffered from occasional attacks of diverticulitis. A fortnight before I was summoned to see her the pain got worse, and she began to feel ill. The day before I saw her she suddenly developed acute pain in the abdomen, and became dangerously ill. I found acute general peritonitis due to a large abscess which had burst into the peritoneal cavity. The abscess communicated with a perforated diverticulum of the transverse colon. Immediate operation saved this patient, but left her with a fæcal fistula communicating with the transverse colon.

Differential Diagnosis.—The main symptom of diverticulitis is usually chronic obstruction associated with the presence of a tumour in the left iliac fossa in a patient between the ages of forty-five and sixty. These are also the symptoms of carcinoma of the colon, and it is very important, if possible, to be able to make a differential diagnosis. This is often a difficult matter, and it is only within recent years that it has been possible.

Very careful examination is necessary. Abdominal palpation and a bimanual examination will usually reveal the presence of a rather firm, fixed tumour in the left iliac fossa or lower part of the pelvis, but will not enable one to distinguish between the two conditions.

Symptoms of chronic constipation or obstruction over a long period are usually present, and will be slightly in favour of diverticulitis rather than cancer.

A careful record of the evening temperature is often of assistance. A raised temperature in cancer is rare, whereas in diverticulitis the temperature is often raised to 99 or 100° in the evening over long periods.

A leucocyte count may be of assistance, a positive count being in favour of diverticulitis.

While the history of a slight amount of blood in the stools is very common in carcinoma, it is usually absent in diverticulitis, and this affords a valuable means of distinguishing between the two conditions. It is by no means invariable, however, as blood is occasionally found with

diverticulitis, and also the patient may be suffering from piles which bleed.

A sigmoidoscope examination should always be made, and will sometimes afford valuable evidence. Occasionally a definite annular stricture without any break in the lining membrane may be seen with the sigmoidoscope. Such a finding, associated with symptoms of obstruction and a tumour, will be very much in favour of diverticulitis as against cancer. Usually, however, the colon is so fixed by adhesions that an instrument cannot be passed far enough to actually see the stricture.



FIG. 197.—CASE OF A MALE, AGED SIXTY-SEVEN. THIRTY-SIX HOURS AFTER OPAQUE MEAL.
One large and some smaller diverticula in the iliac and pelvic colon.
(By kind permission of Dr. Spriggs.)

A normal appearance of the mucous membrane without any blood in the higher part of the bowel, and associated with marked fixation of the colon and a palpable tumour, are important points in favour of diverticulitis.

X rays are the most valuable means we possess of making a definite diagnosis, the appearances of diverticulitis being quite characteristic of this condition. The examination may be either by a barium meal or barium enema. An enema gives the best results, and the patient should be carefully screened, both while the enema is being administered and more particularly after it has been evacuated. The characteristic appearances of diverticulitis are best seen in both cases after the whole of the barium has been evacuated, when, if diverticula are present, they will generally be seen filled with the barium, while the rest of the colon is empty. The appearances are well shown in Figs. 197 and 198. The long, irregular, tunnel-shaped stricture seen in some cases and associated with diverticula is characteristic of diverticulitis. The appearances of a colon affected with



FIG 198.—DIVERTICULITIS OF THE PELVIC COLON.

left side of the abdomen. There is a high or intermittent temperature, with rigors and sweats; pain, localized to some part of the colon; and local peritonitis. A tender swelling may be present, and there may be fluctuation on careful palpation. The abdominal wall is rigid, and the patient lies with the legs drawn up and in considerable pain. If perforation has occurred, the usual symptoms of commencing general peritonitis will show themselves. An exact diagnosis is seldom possible, but when we see a patient with all the symptoms of appendicitis, but with the signs localized to some other part of the abdomen than the appendix region, we should be suspicious of this condition.

It need hardly be pointed out that an X-ray examination is not a safe procedure when there are acute symptoms.

Case.—The patient was a lady, aged sixty-five, who for some two years had suffered from occasional attacks of diverticulitis. A fortnight before I was summoned to see her the pain got worse, and she began to feel ill. The day before I saw her she suddenly developed acute pain in the abdomen, and became dangerously ill. I found acute general peritonitis due to a large abscess which had burst into the peritoneal cavity. The abscess communicated with a perforated diverticulum of the transverse colon. Immediate operation saved this patient, but left her with a fæcal fistula communicating with the transverse colon.

Differential Diagnosis.—The main symptom of diverticulitis is usually chronic obstruction associated with the presence of a tumour in the left iliac fossa in a patient between the ages of forty-five and sixty. These are also the symptoms of carcinoma of the colon, and it is very important, if possible, to be able to make a differential diagnosis. This is often a difficult matter, and it is only within recent years that it has been possible.

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Fig. 197.—Case of a Male, aged Sixty-Seven, Thirty-Six Hours after Opaque Meal.
One large and some smaller diverticula in the iliac and pelvic colon.
(By kind permission of Dr. Spriggs.)

A normal appearance of the mucous membrane without any blood in the higher part of the bowel, and associated with marked fixation of the colon and a palpable tumour, are important points in favour of diverticulitis.

X rays are the most valuable means we possess of making a definite diagnosis, the appearances of diverticulitis being quite characteristic of this condition. The examination may be either by a barium meal or barium enema. An enema gives the best results, and the patient should be carefully screened, both while the enema is being administered and more particularly after it has been evacuated. The characteristic appearances of diverticulitis are best seen in both cases after the whole of the barium has been evacuated, when, if diverticula are present, they will generally be seen filled with the barium, while the rest of the colon is empty. The appearances are well shown in Figs. 197 and 198. The long, irregular, tunnel-shaped stricture seen in some cases and associated with diverticula is characteristic of diverticulitis. The appearances of a colon affected with



Fig. 198.—Diverticulitis of the Pelvic Colon.

diverticula under the X rays when a barium enema has been given are very characteristic, and are usually unmistakable, but it is very essential that the examination should be very carefully done and that the apparatus should be first-rate and capable of giving a really sharp outline to the bowel. A double photograph on the same plate with a five seconds' interval is most useful at times in distinguishing between a simple diverticulosis and inflammatory involvement. Where the bowel is fixed from inflammation the outline will be single in such a photograph, while movable bowel will show a double outline. Lastly, we must not forget that cancer and diverticulitis may be associated in the same patient at the same time.

Since it is possible for a surgeon not to recognize the condition, even when handling the colon at an operation, it is very important that surgeons should thoroughly accustom themselves to the appearances of diverticulitis, the prognosis of which is quite different to cancer.

Prognosis.—The question of prognosis when diverticula are present is a matter of considerable importance, and at the present time there is a good deal of divergent opinion with regard to it. The greatest difficulty arises in cases where there is a very well-marked diverticulosis, but no evidence of inflammatory mischief. It may be said that in general the prognosis is good in diverticulosis, and that if the patients are careful to keep the contents of the colon as fluid as possible, there need never be any development of a diverticulitis. My usual practice in such cases is to watch the patient at regular intervals and take radiograms about every six months. I have a number of such cases which have continued for many years in quite good health, and other authors agree in considering these cases as having a good prognosis. It is nevertheless essential that they should be watched, and that they should not be careless with regard to the condition of the bowel actions.

As a result of watching cases over a considerable period of years, and having regular X-ray photographs taken, I am struck by the fact that there is a very evident tendency for the diverticula to increase both in size and number in course of time, even in spite of the most careful treatment. This is, no doubt, due to the fact that the weakened muscle wall of the colon continues to degenerate and allows the pouches to multiply. There is some difficulty where very extensive diverticulosis exists (such a case is shown in Fig. 190), as the diverticula are often very large and thin-walled. The prognosis in such cases is not good, as accidents are unquestionably liable to occur. One of these cases that I had been watching for nearly two years, and who had been very careful with treatment, suddenly perforated while away in France on holiday, and he died in a couple of days. Where, therefore, the diverticula are very numerous and large a guarded prognosis should be given, as there is great danger of a sudden accident.

Where definite diverticulitis exists the prognosis is much more uncertain. Provided that the attacks of pain and tenderness quiet down completely, and the patient is very careful to keep the contents of the colon fluid, there may be complete immunity from attacks over very considerable periods. Where, however, the attacks recur in spite of treatment, the prognosis is grave, and surgical interference is called for. On no account should an acute abscess be allowed to form, as surgical treatment after that has happened cannot be very satisfactory, and it is much better to anticipate such an event than to wait until it has already occurred. When two or three attacks have occurred after careful treatment, further delay in seeking surgical help is quite unjustified. When there are marked symptoms of urinary irritation surgical treatment is definitely indicated; delay would probably result in the formation of a vesico-colic fistula, with very serious consequences. When an abscess has formed, or there are signs of obstruction, immediate surgical interference is called for.

There is reason to believe that chronic diverticulitis has sometimes a definite relation to the onset of cancer, and this factor must also be taken into account.

In cases of diverticulitis where a colostomy has been performed well above the disease the prognosis appears to be very good. The patients remain in excellent health, and the diverticulitis ceases to cause any trouble.

Results in cases of short-circuiting are not so satisfactory; although the patient is not inconvenienced by a colostomy, the passage of fæcal material into the short-circuited loop continues to keep up the inflammatory mischief, and the symptoms do not subside in the same way as when a permanent colostomy has been done.

Where the whole of the disease has been eradicated by resection the prognosis is, of course, excellent.

The Pathological Conditions arising from Diverticulitis.—Diverticulitis may give rise to any of the following pathological conditions: (1) *Tumour or swelling*; (2) *abscess*; (3) *stricture of the colon*; (4) *adhesions to other organs*; (5) *fistulæ*; (6) *vesico-colic fistulæ*; (7) *cancer*; (8) *general peritonitis*; (9) *deformities and contractions of the mesosigmoid*; (10) *arthritis and fibrositis*.

1. *Tumour Formation.*—Chronic diverticulitis may result in the formation of a tumour which to the naked eye is indistinguishable from a malignant growth, and in many instances it has only been on microscopical examination that the true pathology of the condition has been detected.

The tumour is usually very hard, irregular in shape, and adherent to neighbouring structures. The lymphatic glands draining the affected area are usually enlarged.

On examination after removal, either as the result of an operation or post-mortem, evidence of inflammation is usually noticed. The mass may

be red and œdematous in places, while here and there white patches of lymph can often be seen, which mark the site of recent adhesions to neighbouring structures. The peritoneum is usually rough and much thickened. When cut open the walls are seen to be thickened and indurated, and to the naked eye may closely resemble a malignant growth. In some instances the wall of the bowel has been an inch or two in thickness, and intensely hard. Thickening is due to inflammatory infiltration of all the coats of the bowel, and subsequent formation of fibrous tissue. In fact, the entire bowel wall may be converted into a solid mass of fibrous tissue over an inch in thickness. The thickening is not confined to any one aspect of the bowel wall, but in most cases completely surrounds it, though it is often considerably greater in one part than another. The mucous membrane may be almost unaffected, and on examination be quite smooth; in this respect it differs markedly from the condition usually seen in cancer.

There is usually narrowing of the bowel lumen at the site of the tumour, and this may have resulted in secondary ulceration in the bowel *above* the stricture from fæcal retention. This, however, must not be confused with the primary cause of the condition.

The stricture itself is a secondary result of the formation and subsequent contraction of the fibrous tissue in the wall of the colon, and in this respect closely resembles the formation of the typical ring stricture often seen in cancer of the colon. There may be only a ring stricture, or in some cases a long narrow canal is formed. In some the lumen has been so narrowed as barely to admit a lead pencil. In others, however, considerable tumour formation occurs, with but little narrowing of the bowel lumen.

The most characteristic process is the tendency to proliferative inflammation around the diverticula and in the colon wall, with the formation of dense fibrous tissue.

The thickened walls of the bowel may show necrotic or breaking-down areas, but this is the exception rather than the rule. Careful examination of the walls of the bowel after it has been cut open will not infrequently reveal the presence of diverticula or pouches, usually multiple, and often very narrow.

Microscopical Appearances.—The tumour is generally seen to consist mainly of a dense mass of fibrous tissue and round-celled infiltration, quantities of round cells being interspersed here and there throughout the mass. At the areas of more active or recent inflammation the ordinary appearances of chronic inflammation may be seen—namely, loose connective tissue crowded with lymphocytes. Areas containing necrotic tissue or blood extravasation may also be found. The peritoneum shows chronic inflammatory changes, is usually much thickened, and the muscular coat much atrophied. The mucosa often shows comparatively little change,

but in some cases is a good deal atrophied, the glandular elements having disappeared.

2. *Abscess.*—This is a not uncommon result of diverticulitis. The abscess may be single, or there may be a large indurated mass containing numerous small abscesses.

These are similar to abscesses accompanying appendicitis, and are usually shut off from the general peritoneal cavity by adhesions to neighbouring coils of bowel. The abscess may be post-peritoneal, in which case it is often very extensive, surrounding the kidney, and passing up to the diaphragm and down into the pelvis. The formation of a post-peritoneal abscess seems to be most often associated with diverticulitis of the ascending colon.

A case is recorded by Foggiz of an old woman who died with abscesses in the lung and brain secondary to a septic diverticulitis of the sigmoid flexure. Whyte has also described a case of multiple abscesses in the liver from this cause. An abscess may track behind the peritoneum in almost any direction. I have seen such an abscess, which started in the wall of the pelvic colon, open on the chest, and in another case in the perineum in front of the anus.

3. *Stricture.*—In many instances a fibrous stricture giving rise to obstruction has been the cause of death, or has called for the performance of an operation for its relief. The amount of narrowing of the colon may be very considerable, and as the commonest situation for the condition is in the sigmoid flexure, where the bowel contents are usually solid, obstruction readily occurs.

4. *Adhesions.*—Extensive adhesions of the affected portion of bowel to surrounding structures are the rule in diverticulitis, and are nature's method of protecting the patient from the consequences of the condition.

Favel tells of a woman who suffered from persistent pain in the abdomen, which was found on performing laparotomy to be due to extensive adhesions between the ascending colon and the anterior abdominal wall. In another case, in which the patient suffered from constant pain and frequent vomiting, adhesions were found between the ascending colon and the abdominal wall, involving also the uterus. In both cases the adhesions had arisen from a localized diverticulitis of the ascending colon.

In men the adhesions are generally to the back of the bladder, low down, and to the front of the rectum and pelvic peritoneum. In women the adhesions are most commonly to the back of the uterus and to the left of the Fallopian tube.

Intestinal obstruction resulting from adhesions produced by diverticulitis may occur, and is generally due to adhesions between the small intestine and the colon.

5. *Fistulæ.*—These may form from the formation of an abscess which opens upon the abdominal wall, producing a cutaneous fistula, or a communication may take place into some other hollow viscus, such as the stomach or small intestine. These fistulæ may be multiple, and I have seen as many as six separate openings on the abdominal wall all communicating with the colon.

6. *Vesico-Colic Fistulæ.*—One would naturally expect diverticulitis, when it affects the sigmoid, to be a common cause of adhesions between this viscus and the bladder, with which it is in close contact, and that the subsequent formation of a fistula between the two would be a not uncommon complication. This was actually present in twenty-two of my collected cases.

Diverticulitis is probably the commonest cause of these fistulæ, as was pointed out by Harrison Cripps many years ago, when he showed that the cause was inflammatory in forty-five cases out of sixty-three, and malignant in only nine, though it seems generally believed that malignant disease is the commonest cause of these fistulæ. Chavannaz, from a study of ninety-five cases, came to the conclusion that 24 per cent. only were due to malignant disease.

Telling, after a careful investigation of the subject, concludes that diverticulitis arising from diverticula of the colon is the commonest cause of these fistulæ, and points out that this much improves the prognosis as regards operative interference.

I have had twenty-two cases under my own observation in which perforation into the bladder has taken place. In a few, symptoms in the shape of bladder irritability were present for some time before actual perforation occurred, but in others the first sign of any bladder trouble was an acute cystitis accompanied by the passage of flatus and fæces per urethram.

It is a curious fact, showing how tolerant to infection the bladder may become, that while a very acute cystitis with much pain and large quantities of pus in the urine always occurs after perforation, yet after a time the cystitis tends to subside and the bladder becomes accustomed to the new conditions, so that beyond the presence of small quantities of fæcal material and flatus in it, the urine shows little evidence of the gross contamination which is taking place.

I have never met with a case of perforation of the bladder in a woman, and it is probable that the presence of the uterus tends to prevent it occurring, and, so far as I am aware, no case of perforation of the bladder in a woman has been recorded to date.

There seems to be no tendency for the perforation to close apart from operation, and the fistula remains open for an indefinite period. When a perforation into the bladder has taken place, the proper treatment is an

immediate colostomy, so as to prevent the fæcal material from finding its way into the bladder. As a rule, the bladder fistula quickly heals once the colostomy is established.

The following case well illustrates what may be expected in such a case:

Case.—The patient was a gentleman, aged sixty, who for some years had suffered from symptoms pointing to a chronic obstruction in the sigmoid flexure, associated with a certain amount of pain. Some years before I saw him the symptoms had become much worse, and he had begun to lose flesh. He had a nocturnal temperature, with occasional rigors and periods when he felt very ill. Then a perforation into the bladder occurred, accompanied by very acute cystitis and the passage of flatus per urethram. This continued for some months, and at the time when I saw him he was in a great deal of distress and was still passing flatus from the bladder. There was no bad cystitis, and micturition was not particularly frequent. On examination there was a large tumour extending from the upper level of the prostate in the left iliac fossa. A diagnosis of diverticulitis was made and colostomy advised. I performed a transverse colostomy, and within three weeks the fistula of the bladder had healed. The patient began to put on weight, and all his symptoms very rapidly disappeared. The urine eventually became quite normal, and the patient made a complete recovery. This patient remained in good health for sixteen years, and died eventually from a stroke.

Other Kinds of Fistulæ.—Fistulæ opening into other organs are rare, but a few have been recorded. A fistula between the sigmoid flexure and the left Fallopian tube is recorded by le Jemtel, and a case is reported by Klebs where perforation occurred into a hernial sac on the left side. Fistulæ into the small intestine have also been reported.

7. *Cancer.*—I have seen several cases in which there was a cancer at the recto-sigmoid junction associated with several large diverticula of the sigmoid and diverticulitis. The greater part of the sigmoid showed considerable inflammatory thickening. It was impossible to be certain that the diverticulitis was the primary condition, but it appeared probable.

The association of cancer and diverticulitis in the same patient is not uncommon, but it does not follow that the latter condition is the cause of the former. We have to bear in mind that both conditions tend to occur at about the same age (forty-five to sixty-five), and it may be that their presence in the same patient is fortuitous. In a few instances where carcinoma has developed in an old sinus due to diverticulitis it seems very probable that a causal relationship exists. In McGrath's series of twenty-seven cases reported from the Mayo Clinic carcinoma was present in seven, or 25·9 per cent. All these cases showed advanced inflammatory mischief.

The history has generally been the same—namely, chronic inflammatory mischief around the colon with abscesses opening into the bowel, bladder, or on to the skin surface. It would seem probable that cancer is a late complication of chronic septic diverticulitis—that is to say, that it is in neglected cases that carcinoma is most probable, and this is an important argument in favour of early colostomy.

8. *General Peritonitis.*—General peritonitis may result from diverticulitis, and is a common cause of death from this disease. It may result from a direct perforation of the wall of the colon, due to ulceration or to sloughing of the end of a diverticulum of the colon or from rupture of a pericolic abscess into the peritoneal cavity. In one case a fæcal concretion was found loose in the peritoneal cavity, and on the anterior aspect of the sigmoid flexure there was a diverticulum which was partly gangrenous.

Most cases of diverticulitis which have been left untreated have died of general peritonitis. In some of these it had not been possible to demonstrate any opening through which infection could have reached the peritoneal cavity, and the abscess, if present, was apparently shut off. In these cases we must assume, either that the opening had been overlooked, had been closed again before death, or that the organisms had passed through the walls of the abscess without perforation being present.

In a few cases sudden acute general peritonitis occurs simulating acute gangrenous appendicitis, though on the wrong side. This may be due to a diverticula having become gangrenous, or to the sudden rupture of an abscess outside the bowel wall. Diverticulitis should be thought of in the case of acute abdominal catastrophe when the pain and tenderness originated on the left side. The previous history will tend to confirm the diagnosis.

9. *Deformities and Contractions of the Mesosigmoid.*—It is obvious that if chronic inflammation occurs in and around the wall of the sigmoid flexure, the mesosigmoid will be liable to be involved in the subsequent contraction caused by organized fibrous tissue. This arises not uncommonly, and the mesosigmoid may be shortened, contracted, or otherwise deformed to a considerable extent as the result of an old-standing perisigmoiditis.

Such contractions may be of no consequence to the function of the bowel, but occasionally may result in kinking or angulation of the sigmoid, or in such impaired mobility that a serious impediment to the passage of the fæces results. In this way actual acute obstruction—or more frequently a chronic obstruction—is produced. This subject has already been considered in dealing with volvulus and angulation of the pelvic colon.

10. *Arthritis and Fibrositis.*—These conditions may be a direct result of diverticulitis. I have not infrequently seen them associated. Spriggs also mentions joint changes as being seen in chronic cases of the condition.

Treatment.—The chief principle of treatment in these cases depends upon the fact that it is the contents of the diverticula which constitute a danger rather than the presence of the diverticula themselves. If we can insure that the contents are liquid, the tendency to inflammation and abscess will be very much diminished. There are several ways of doing this. The best method is to put the patient on sufficient doses of liquid petroleum by the mouth to insure that the stools will not be formed and will never be firmer in consistency than cream. This generally means that the patient will be required to take an ounce of petroleum before meals twice or three times daily. The minimum dose of petroleum necessary to obtain the result should be found, and the patient should then continue to take the dose indefinitely. If petroleum is not well tolerated, it may be taken in the form of emulsion with agar-agar, of which there are numerous preparations on the market. Sometimes patients cannot tolerate petroleum in any form without getting indigestion. When this is the case some suitable aperient must be given daily, and is best combined with a small dose of salts each morning. In any case the patient must be careful to keep the contents of the colon always liquid. When there are acute symptoms the patient should stay in bed on a very light diet, and the colon should be washed out. This must be done very carefully with a funnel and tube, and under very low pressure. The best solutions are bicarbonate of soda, 2 drachms to the pint, and later potassium permanganate, 1 to 10,000. Oil injections are also sometimes useful. He should not be allowed up until all tenderness has gone and the temperature has been normal for some days. Hot compresses to the abdomen are also useful if there is pain.

There is no point in dieting the patient except during acute attacks, as the contents of the colon are not thereby much altered. Certain foods should be forbidden on account of the hard residue which they are liable to result in. Fruits containing pips should be forbidden in any form, such as tomatoes, strawberries, etc.

General attention to the hygiene of the alimentary tract is desirable: septic teeth must be attended to and badly fitting dentures rectified. It is doubtful if any intestinal disinfectants are of much use, but 20 drops of castor oil at bedtime may be given with this object, or the patient may be given *Bacillus acidophilus*.

The patient must be warned that riding long distances in a motor-car is liable to bring on an attack, or any journey that involves much shaking and bumping.

On no account must he have massage to the abdomen, as it is very liable to set up trouble Exercise is good if taken in moderation.

Such treatment, if properly and continuously carried out, will often enable a patient to live for many years without any further attacks, but a cure of

the condition by such means is not possible, as the diverticula are still present and may cause trouble.

It is just as important that this régime should be adhered to by patients suffering from diverticulosis, for it is the only way in which they can prevent diverticulitis eventually supervening.

Operative Treatment.—Unfortunately the condition is not so easily amenable to operation as is the case with appendicitis. The infective focus is not so localized, nor can it be so readily remedied by the surgeon. In the acute cases, where perforation has occurred with general peritonitis, the only treatment is to drain the abdomen and perform a colostomy well above the perforation. As a rule the perforation will be in some part of the pelvic colon, and in this event the artificial anus should be made with some portion of the left side of the transverse colon. In a few cases simple drainage of the abdominal cavity has been successful, the opening in the bowel closing up. This can hardly be relied upon, however, and is not likely to occur unless the perforation is very small. Deliberate closure of the opening caused by the ruptured diverticulum would seem a possibility, but this is seldom the case. The parts around the opening are much thickened and indurated, and such tissues do not lend themselves readily to satisfactory closure; omental grafting of the opening would be safer, but unless the diverticulitis is very localized attempts to close the opening will usually be failures and may be disastrous; colostomy is the best procedure. When a perforation has occurred into the bladder, immediate colostomy above the site of perforation is the only rational treatment. I have seen a number of such cases, and in all of them the opening into the bladder subsequently healed up quite satisfactorily.

The most difficult cases to deal with are those in which an abscess has formed in association with some part of the colon, and the abscess has subsequently burst or leaked into the peritoneal cavity. The obvious treatment is to drain the abdominal cavity, and to drain the abscess cavity separately. Unfortunately, what is generally found is that there is a dense mass of gut and adhesions forming the wall of the abscess, which is most difficult to drain properly, and that it is not possible to in any way disentangle or break up the adhesions without the certainty of damaging other parts of the intestine. These are most difficult cases, and even when the patient survives the initial peritonitis, residual abscesses and pocketing are the usual rule, and will call for all the skill and resources of the surgeon to circumvent. I know of few more dangerous lesions to meddle with than a mass of diverticulitis of the colon, with adhesions to other organs and parts of the intestine. The lesion is highly septic, and the density of tissue is only equalled by carcinoma. The abscess resembles a sponge more than an ordinary abscess cavity, and it is very difficult to establish any kind of satisfactory drainage.

When there is reason to suspect that an abscess has formed from perforation of a diverticulum, but the general peritoneal cavity is not involved, there should be no attempt to temporize in the hope that the abscess will subside. The condition is too dangerous, and even if a general peritonitis does not result, perforation of the abdominal wall or some hollow viscus will almost certainly take place and make conditions for operation more difficult. Operation in these circumstances is particularly difficult and dangerous, and very nice judgment is necessary to decide what is the best course to take. I prefer, when operating upon such cases, to use an oblique incision on the left side of the abdomen, the rectus muscle being dissected out of its sheath and displaced towards the right side; local anæsthesia of the rectus muscle is a great help. This gives very good access and allows of good draining in the flank if this should be necessary. The pelvic colon, assuming that this is the portion involved, should be freed if possible by very gentle manipulation, while the main abdominal cavity is well protected by large intra-abdominal swabs so placed as to localize as much as possible the contamination of the peritoneal cavity which may occur. The involved part of the pelvic colon should be lifted up, if it can be freed, and drawn well over into the left iliac fossa, and the abscess cavity properly drained with a tube or tubes. If the omentum is large enough, it should be drawn down and stitched all round the damaged portion of the colon, so as to seal it off and at the same time prevent the small intestine from subsequently becoming adherent to it. The wrapped-up damaged portion of colon should be fixed with a few catgut sutures well into the left iliac fossa and away from the true pelvis, as if subsequent abscess formation should occur it will do less harm in this situation and will be much more accessible. I have had some very successful results from this method of treatment, and in one or two cases have been able to separate the diseased portion of the colon from the bladder, and thus prevent perforation into that organ. Patients treated in this way have got perfectly well, and with reasonable care have been able to live normal lives for very many years. I have now quite a number of such cases under observation. They have been saved a colostomy, and the inflammatory mischief has in course of time entirely cleared up in most of them, although some have had temporary relapses. The fact that the inflammation is no longer involving the true pelvis renders treatment much safer.

If at the time of operation the damage to the bowel is too severe to justify this method of procedure, a colostomy should be done well above the site of the trouble; this will generally mean a transverse colostomy. When this plan has been adopted the question will subsequently arise as to whether it is possible to close the colostomy. This is always a difficult question and will require careful consideration, as the patient's life is

perfectly safe if he is content to keep the colostomy, and its closure will involve a fair amount of risk. It is doubtless worth some risk to get rid of the colostomy, but as this is mainly a question of comfort and convenience, it hardly justifies running a serious risk to life.

Good X-ray photographs of barium enemata will be necessary to see if there is a free enough lumen to justify closing the artificial opening, and also to ascertain whether there is sufficient healthy bowel below the lesion to enable a resection to be done. If a closure is to be done it must not be postponed too long, or the bowel will have become too narrow below the colostomy. Six to eight months is probably about long enough, and, of course, in any case, complete subsidence of all inflammatory symptoms should have taken place. In most of the cases coming under my care the colon at the site of the trouble has been too badly damaged, or its lumen has become too restricted, to warrant any attempt at closing the colostomy without resection of the lesion. I have, however, on several occasions resected the damaged bowel and rejoined the ends successfully, but I have considered it safer to leave the closing of the colostomy to a subsequent operation after the newly joined bowel had properly united.

Resection of the damaged bowel is rather a difficult matter, as there are almost invariably quite a number of dense adhesions to be dealt with before it is possible to free the bowel enough for a resection, and it must always be borne in mind that we are dealing with old septic material, which must not be cut into. When the join has been made—and as a rule only an end-to-end join is possible—the junction should be wrapped up in omentum.

The accompanying table shows the results in fifty-six cases of the various operations that have been performed for diverticulitis in recent years by myself:

ANALYSIS OF FIFTY-SIX CASES TREATED BY OPERATION.

	Number of Cases.	*Number of Deaths*
Resection	13	3
Colostomy	18	0
Short-circuit	3	0
Adhesions separated	19	1
Drainage only	3	2

The mortality in this table from resection is misleading, as two of the deaths were due to pneumonia a week or more after operation. The alternative to resection in these thirteen cases would have been colostomy, as chronic obstruction was present in all of them.

Localized Abscess.—The obvious treatment is to open the abscess and adequately drain it, while at the same time preserving as far as possible the natural adhesive barriers protecting the general peritoneal cavity.

The abscess may be very extensive, and for adequate drainage to be established it may be necessary to make a counter-opening in the loin.

When dealing with an abscess in the bowel wall, there may be much difficulty in locating it owing to the dense mass of surrounding adhesions. This is well exemplified by several of the cases in which, after an exploratory laparotomy had been performed without any abscess being discovered, the post-mortem examination showed such to have been present.

Perforation and General Peritonitis.—In these cases, though the establishment of adequate drainage may suffice, it is advisable, if possible, to find and close by sutures the perforation in the colon. Where the perforation is due to the rupture or sloughing of a diverticulum, the perforation may not be single, or other diverticula may be so nearly in the same condition as to threaten to perforate. Also when, as often happens, the perforation has occurred in a dense mass of fibrous tissue and adhesions, very great difficulty may be experienced in closing the perforation.

Perforation has most frequently resulted from the sloughing or rupture of a diverticulum, usually upon the free border of the sigmoid colon.

The best results have been in cases accompanied by tumour formation. The tumour has in almost every instance been diagnosed as carcinoma previous to operation, and in several instances its inflammatory nature has remained undetected until a microscopical examination has been made. Here again we see the importance from the point of view of treatment of a correct diagnosis. The collected cases show clearly that in quite a number of instances the surgeon has abandoned the operation under the impression that he was dealing with a hopeless case of cancer of the bowel; whereas, had he known that he was only confronted with a simple inflammatory tumour, he might have successfully resected it.

I believe that, apart from a few exceptional cases, the best treatment is colostomy, followed by excision when possible a year later. Unless plenty of time is allowed for the inflammation to subside, resection will prove highly dangerous.

CHAPTER XXIX

TUBERCULOSIS OF THE COLON

TUBERCULOUS lesions of the colon are not uncommon. Thus Eisenhardt, out of 1,000 tuberculous subjects, found such lesions of the intestine in 56 per cent.; in most of these the colon was affected. In all but four of his cases the condition was secondary to phthisis. Similarly, Herscheimer found it present in all but one out of fifty-eight cases of phthisis.

In considering these figures, however, it must be taken into consideration that practically all these patients had either died from, or were under treatment for, phthisis. Also they only refer to the ordinary ulcerative, and usually secondary, form of intestinal tuberculosis. There can be no doubt that this form of ulcerative colitis is a common secondary complication of phthisis, and the infection is probably caused by the sputum which is swallowed.

There are three types of tuberculous disease of the colon: (1) Where it forms part of a general or miliary tuberculosis; (2) tuberculous ulceration; (3) hyperplastic tuberculosis.

Tuberculous Ulceration of the Colon (Tuberculous Colitis).—In the ulcerative type the infection is certainly secondary in most cases to tuberculous lesions of the lungs and air-passages, or the higher parts of the alimentary canal, and is due to direct infection of the mucous membrane with tubercle bacilli. I have been unable to find any case of primary tuberculous ulceration of the colon, and it seems probable that it is always a secondary tuberculous manifestation due to direct infection. In a certain proportion of cases the ulceration of the colon is secondary to caseating mesenteric glands. In one case it was apparently secondary to tubercle of the genito-urinary tract. Rarely, however, tuberculous ulceration of the colon may exist apart from evidence of general tuberculosis. Cautley has recorded the case of a girl, four years of age, who had been ill for a year. During six months the stools had been frequent, loose, and very offensive, and for two weeks they had contained small black particles of clotted blood. Vomiting occurred daily, but there was practically no abdominal pain or distension, and no fever. She died, and at the autopsy two tuberculous ulcers causing stricture were found in the colon. There were also extensive ulceration of the cæcum and multiple ulcers in the small intestine, with a little adhesive peritonitis at their bases, but no caseous mesenteric glands. A small old caseous nodule was found at the apex of the left lung.

The ulceration in these cases is of the typical tuberculous type, with overhanging edges and a raw, unhealthy base. On microscopic examination numerous caseating areas can be seen, and tubercle bacilli are present in great numbers. The ulcers are usually multiple, and often extensive, tending to encircle the bowel; as a rule there is little or no thickening of the bowel wall, in which respect it differs markedly from the hyperplastic type of lesion.

Secondary deposits of tubercle and caseation in the mesenteric glands are common, though in one case there was no infection of the glands.

The ulcers may occur in any part of the colon, but are most commonly seen in the cæcum and ascending colon. The ulcers may perforate the bowel wall, and cause either abscess, fistula, or general peritonitis. In four of the cases of perforating ulcer of the colon which I collected the ulceration was tuberculous.

A remarkable case is reported by Grey Turner in which tuberculous ulceration of the ascending colon apparently resulted from infection of a false diverticulum of the cæcum. The wall of the diverticulum was infiltrated with tubercle, and the ulceration had extended into the surrounding tissues. Stewart has recorded two cases of tubercle in relation to sigmoid diverticula.

While the formation of a stricture as the result of tuberculous ulceration of the ileum is common, it very rarely occurs in the colon. Fistula formation is, however, not uncommon. The fistula may open on to the skin surface, into another part of the bowel resulting in a short circuit, or into the vagina, rectum, or bladder.

Hyperplastic Tuberculosis of the Colon.—The hyperplastic form is apparently in some instances a primary tuberculous lesion; in most of the recorded cases there were no symptoms of tuberculosis elsewhere, and in two or three of them an autopsy was made, and a careful examination failed to reveal any other lesion of the kind. Also in a considerable number of the hyperplastic cases there is no ulceration, and the mucous membrane is intact. It is a very disputed point in these cases whether the tubercle bacillus reaches the colon wall from the bowel lumen or by the blood-stream.

Hyperplastic tuberculosis of the colon is definitely a surgical disease, as it gives rise to tumour formation and stricture of the bowel, and the only rational treatment is by operation.

It has been repeatedly mistaken for cancer, which in symptomatology it closely resembles, though it has a different age incidence; 80 per cent. of the cases collected by Stewart were under the age of forty. It has seldom been diagnosed previous to operation, and often only then after a microscopical examination.

The lesion appears to be very rare. It is not mentioned in most surgical

or medical textbooks, but this is doubtless partly due to the fact that the condition is not well known and is frequently not detected.

This peculiar form of intestinal tuberculosis was first described in detail by Hartman and Pilliet in 1891. It is of particular interest for two main reasons: First, that it is a manifestation of tubercle quite unlike the lesions usually met with in other organs, with the exception of the larynx; secondly, because it is quite commonly mistaken for carcinoma of the bowel. In fact, there is little doubt that a great many of the cases of supposed cancer of the bowel which have got well without operation, or after such operations as short-circuiting or colostomy, were really cases of this disease. They will, however, be referred to again later (see p. 510).

There is much difficulty in studying this disease, as it is hardly yet recognized generally, and consequently cases are often described under some other heading, or simply recorded as rare conditions; in many no proper microscopical examination has been made for tubercle bacilli in the tissues.

The disease appears to occur with about equal frequency in the two sexes. Thus, out of my series of 80 cases, 47 were males and 33 females. In Bernay's 71 collected cases there were 40 men and 31 women. Conrath collected 77 cases, and found 36 men and 41 women.

This affection chiefly attacks those in the middle period of life, between twenty and forty years of age. This corresponds very closely with the average age for phthisis. In my series the average age is thirty-two; the oldest patient is seventy-eight and the youngest seven years of age.

It is generally localized to one part of the colon; occasionally, however, there are two or three distinct lesions; and in a few very rare cases the whole or a large part of the colon is affected. It may arise in any portion, but by far the commonest situation is the cæcum and lower part of the ascending colon. The appended table shows the distribution in a collected series of 100 cases:

	Cases.
Sigmoid flexure	6
Cæcum	48
Cæcum and ascending colon	39
Whole colon	4
Cæcum, ascending and transverse colon	3
Total	100

There appears to be no explanation why the cæcum is the most commonly affected portion.

The characteristic feature is the formation of a tumour in some part of the colon, accompanied by stricture of the bowel lumen. The disease is essentially chronic, the inflammation encouraging the formation of fibrous tissue and thickening, rather than caseation or ulceration. In many cases

the mucous membrane is quite intact, and there is no sign of ulceration. The bowel wall, however, becomes in time greatly thickened, with the formation in most cases of a definite tumour. Constriction and stricture of the bowel may ensue and cause intestinal obstruction. Secondary abscess may occur, but this is unusual. Tuberculous peritonitis is likewise uncommon.

The disease differs very much from common tuberculous lesions, and resembles certain rare cases of tubercle of the skin and larynx, and especially those cases of Hodgkin's disease which, post-mortem, have been found to be tuberculous.

As a rule, there is a single tumour; but in a few cases there have been several. Trendelenburg has reported a case in which there were five distinct strictures of the colon from this cause; and Borch one in which there were four.

Association with Other Tuberculous Lesions.—As a rule, the condition of the colon is the only manifestation of tubercle to be found; in only twenty-four out of the one hundred cases I have collected was there any evidence of tubercle elsewhere. In several of these it seems almost certain the other lesion was secondary to that in the colon.

TABLE OF ONE HUNDRED CASES.

	Cases.
No other tuberculous lesion	76
Tuberculous cavity in lungs or scars of old phthisis	18
Tuberculous peritonitis	1
Tubercle of tibia	1
Tubercle of genito-urinary tract	2
Tubercle of phalanges	1
Tuberculous ulcer in vagina	1
Total	100

It seems evident, therefore, that in most of the cases the disease is a primary tuberculous lesion.

When the cæcum is the affected region the appendix is not as a rule primarily involved, though it not infrequently becomes so secondarily.

Morbid Anatomy.—The most characteristic lesion is the formation of a tumour in some portion of the colon. The most usual situation, if the thickening is localized to one part of the colon, is the cæcum, especially in the neighbourhood of the ileocæcal valve. Sometimes, however, the transverse colon, or sigmoid, has been alone affected. In a case reported by Claude, the ascending and descending colon were affected, but the transverse colon was free.

In others the greater part of the colon has been involved, and in Lartigau's case the greater part of the small intestine as well. Commonly, the affected portions of bowel are matted in a mass of fibrous adhesions and enlarged lymphatic glands, so that often a large tumour is produced,

The most conspicuous feature is the thickening of the colon wall, which is very marked in all cases. In this it differs widely from other forms of tubercle of the bowel, as, instead of there being a destruction of tissue with thinning, there is usually no ulceration, but great thickening and new formation. The bowel wall feels firm and hard, due to infiltration with round cells and the deposit of fibrous tissue. This spreads equally round the circumference of the bowel wall, so that in extreme cases the bowel is converted into a hard tube almost resembling a gas-pipe; considerable narrowing of the lumen follows as a result of the disease, and in most cases stenosis results, and chronic or acute obstruction. Stenosis is the common feature, and the bowel lumen may be so completely blocked that it cannot



FIG. 199.—TRANSVERSE SECTION OF THE WALL OF THE COLON IN A CASE OF HYPERPLASTIC TUBERCLE UNDER HIGH POWER.
Note deposits of hyaline material.

be detected post-mortem. Even where no definite stenosis is present, the thickening of the bowel wall ultimately prevents the peristaltic movements from taking place, and obstruction results from this cause.

In addition to the formation of stenosis by hyperplasia of the bowel wall, narrowing of the lumen may occur from the contraction of ulcers, and from kinking of the bowel by the contraction of adhesions.

Where the stenosis and thickening are local, considerable dilatation of the colon above the stricture may occur, and secondary stercoral ulcers may form. Commonly, the mucous membrane appears normal, and there is no ulceration or breach of the surface. Sometimes the mucous membrane is ulcerated. This is most frequent where there is stricture of the bowel lumen, the ulceration being often confined to the strictured area.

This has led some observers to conclude that the stricture is the result of ulceration, which it certainly is not, as some of the cases where there is marked stricture show no ulceration. In many, the ulceration is the ordinary form of septic or traumatic stercoral ulcer found above a stricture of the bowel. In fact, the ulceration, though it may occasionally be tuberculous, is probably most often a secondary result of the stricture.

The mucous membrane is usually thickened, and may show numbers of small tubercles scattered over its surface.

A striking feature in many cases has been the formation of polypoid or papillomatous outgrowths on the mucous membrane. The polypoid growths are usually pedunculated, and hang free in the bowel lumen. Similar sessile tumours are sometimes present in addition, which suggests that this is the early form of the pedunculated polypi. Polypoid growths are often very numerous, and give a most curious appearance to the bowel. They vary in size from quite small round polyps to those as large as

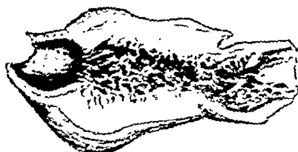


FIG 200.—HYPERPLASTIC TUBERCULOSIS OF THE COLON.
(Mr. Nash's case.)

hazel-nuts. They are covered over with a layer of epithelial cells similar to the surrounding mucous membrane, and their centre is continuous with the submucous layer of the bowel wall, and consists of connective tissue and round-celled infiltration. Occasionally there are caseous foci in the centre of these polypoid growths which may in places have ulcerated through the epithelial layer.

A case is described by Gordon Watson of a woman, aged forty-six, with a hyperplastic tubercular stricture of the cæcum containing many polypoid masses. This was successfully resected.

A very similar appearance is sometimes seen in cases of chronic tubercle of the bladder.

The tumour is very hard and densely indurated. The peritoneum, as a rule, appears normal to the naked eye, though in some cases it is covered with small raised tubercles or nodules of a reddish colour.

If the mass is cut open, the walls of the bowel are seen to be greatly thickened, often to an inch or more, and look and feel like cartilage. The

cut section has often a curious bluish-grey translucent appearance and a glistening surface. The muscular coat is generally much thickened, and can be distinctly seen.

Often the greatest thickening is in the subserous layer, which consists of greyish translucent fibrous tissue of cartilaginous hardness, with irregular-shaped areas of yellowish tissue here and there.

The bowel lumen is usually markedly strictured, or there are outgrowths into it. The whole tumour is often very vascular; in some cases it shows areas of degeneration or caseation.

Two types of lesion have been described, the submucous and subserous, according as the thickening and induration are chiefly in the submucous or subserous layers. Both conditions, however, may be seen in the same

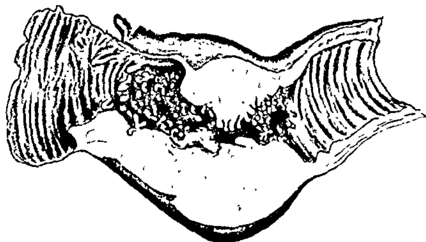


FIG 201.—HYPERPLASTIC TUBERCULOSIS OF THE COLON.
The bowel has been cut open longitudinally.

case, and there seems little advantage in making a distinction between these two forms.

The disease often so closely resembles colloid cancer of the colon that it is only distinguished from it on microscopical examination.

Histology.—The mucous membrane often shows little if any change beyond some thickening. Cells undergoing mucoid or cystic degeneration are not infrequently seen. If ulceration is present, the mucous surface presents a mammillated appearance, or is altogether absent.

Polypoid growths, if present, are seen to be outgrowths from the submucosa, and their centres are continuous with it. The epithelium covering them is the same as the normal epithelium, except where ulceration is present, or unless caseation has occurred.

The submucosa is generally markedly thickened by round-celled infiltration and the formation of dense fibrous tissue. Tubercles and giant cells are often to be seen in this layer in considerable numbers. Large

polymorphonuclear round cells and coarsely granular eosinophile cells are also to be seen, especially towards the mucous membrane. There may also be caseating tuberculous foci in this layer. The predominating feature is, however, round-celled infiltration with fibrous tissue.

There is always much thickening of the muscular coats, due chiefly to small round-celled infiltration. It is doubtful whether there is really any increase in the number of muscle fibres such as would constitute a true hypertrophy. Some observers claim that there is, while others are equally emphatic that there is not. If dilatation has occurred above the stricture, *the muscular coat may be hypertrophied; but apart from this, the hypertrophy* appears to be due chiefly to increase in the connective tissue between the fibres (see Fig. 199).

The subserous layer is often greatly thickened owing to new connective-tissue formation. There is a dense mass of fibrous tissue and small round cells. There are numerous new bloodvessels, often with thick walls.

This layer often contains large vacuolated spaces holding yellow fatty tissue. Giant cells and areas of caseation are much less numerous here than in the submucous layer. The serous layer shows very little change, though it may be much thickened. Tubercle bacilli can usually be found in the submucous layer if sections are carefully stained; compared with other tuberculous lesions, however, they are very scanty. They may be found in large numbers in a section from one part of the tumour, and not at all in a section from another; while in several cases they have been looked for with great care in vain. Portions of the growth have in several instances been inoculated into animals and caused tuberculosis. Though direct evidence of tubercle is not always obtainable, there can be no doubt of the tubercular nature of this curious lesion of the colon. It probably results either from a very mild infection, or from a high degree of resistance to tubercle in the individual.

Symptoms.—Tuberculous ulceration of the colon gives rise to the ordinary symptoms of ulceration of the bowel, and does not differ in this respect from the non-tuberculous forms of ulcerative colitis. As already stated, it usually occurs as a terminal condition in the later stages of tuberculosis of the lungs. The occurrence of diarrhœa and bloody stools, combined with well-marked signs of phthisis, is indicative of the onset of this condition. Occasionally single ulcers may form and perforate, and in a few instances general peritonitis has occurred from the perforation of a tuberculous ulcer in the colon.

The symptoms of hyperplastic tubercle of the colon are those of a chronic pericolitis. A tumour slowly develops in the abdominal cavity, usually in the cæcal region, and is accompanied by a varying amount of pain and tenderness. In some cases, however, there is little, if any, pain, and the tumour is the only sign of anything wrong. Sooner or later the

patient either has recurring attacks of partial obstruction, or an acute attack of complete obstruction.

It is obvious that the symptoms of hyperplastic tubercle of the colon are the same as for cancer of the colon; and as the latter is the more common disease, it is hardly surprising that the vast majority are diagnosed as cancer.

Chronic tubercle of the colon is usually a disease of early life as compared with cancer, and this may help to distinguish between them.

Bleeding and diarrhœa are often early symptoms of chronic tuberculosis of the colon, and in this respect it imitates cancer very closely; but the complete absence of blood in the stools, even on microscopical examination, is slightly in favour of tubercle, more especially if the tumour has existed for some time.

Tubercle bacilli can only with difficulty be discovered in sections of the colon wall, and are practically never found in the stools.

Secondary Lesions.—Stricture is an almost invariable accompaniment of the lesion. It is due mainly to the contraction of the fibrous tissue in the bowel wall, and sometimes partly to outgrowths into the lumen. The amount of narrowing of the lumen is often considerable, and the bowel may be almost blocked.

Intestinal obstruction is a common terminal result. As already stated, when ulceration is present it is probably in most cases a stercoral ulceration secondary to the stricture, though sometimes due to caseation of the submucous layer and consequent destruction of the mucous membrane.

Dilatation and hypertrophy of the bowel above the stricture is common, and stercoral ulcers in the dilated portion of bowel have been present in several patients.

J. S. Cullen records a case where the disease involved the descending colon, causing a stricture which would not admit a bird shot. The cæcum had perforated. Operation was performed, and the mass completely resected with excellent results.

In one case recorded by Crowder the tumour had apparently undergone secondary malignant change. It was situated in the cæcum, and presented the typical appearances of hyperplastic tuberculosis with giant cells and tubercle bacilli. In one part the epithelial cells had penetrated to all depths of the tissue, and there were masses of atypical epithelial cells forming tubercles. Apparently the tuberculous lesion was the primary one, and part had undergone secondary malignant change.

The glands are usually enlarged, and show giant cells and caseating areas; but in several cases there was no gland enlargement. In many the tumour was tied down by dense adhesions, and in some abscess and fistula had formed. These complications, however, generally mark an advanced

stage of the disease, when stricture and secondary ulceration have occurred, and are in no way typical of the condition.

The following case was reported by the late Mr. F. S. Kidd:

Case.—The patient was a girl, aged seven. Three years previously she developed an ulcer in the vagina, which appeared to be tuberculous, and a fæcal fistula formed. Several operations performed with the object of closing this fistula had failed. The abdomen was opened, with the object of performing colostomy, and it was then found that the sigmoid flexure was represented by a hard, indefinite mass about 6 inches long. The whole mass was very vascular. It was diagnosed as cancer, and was brought out of the abdomen, and an artificial anus established. A few days later the growth was cut away. The child recovered with an artificial anus.

Examination of the specimen showed a tight stricture 2½ inches long. There was some ulceration at the site of the stricture, but elsewhere the mucous membrane was normal. The subperitoneal layer of the bowel wall was greatly thickened, and had undergone a curious transformation into pale bluish hyaline tissue almost as hard as cartilage; in places this was nearly 2 inches in thickness. Microscopical sections showed fibrillæ, fibroblasts, and round-celled infiltration. There were also numerous large endothelial cells. Sections were stained for tubercle bacilli, but they could not be demonstrated; the condition was, however, evidently hyperplastic tuberculosis.

"Gas-Pipe Colon."—There are a few very rare cases of hyperplastic tuberculosis of the colon in which the whole or the greater part is uniformly thickened and densely indurated, and for want of a better term I have called these cases "gas-pipe colon," owing to the resemblance of the bowel to a piece of iron gas-pipe.

I have been able to collect five of these curious cases, one of which I saw myself, and four are from other sources. The close resemblance between them makes it certain that they were all of the same nature. One was reported as a case of diffuse carcinoma; but it seems certain, from the resemblance to the others and from the fact that symptoms had existed for fourteen years, that it was really hyperplastic tuberculosis.

In my case the patient was a lady, aged seventy-two, who was supposed to be suffering from intestinal obstruction due to cancer of the rectum; some resistance could be felt high up in the bowel. On opening the abdomen to perform colostomy, it was discovered that the entire large bowel, from the rectum to the cæcum, consisted of a hard tube with non-collapsible walls, resembling more than anything else a piece of iron gas-pipe. The colon was diminished in size, being barely an inch in diameter in many places. It was bound down to the posterior wall of the abdomen, and everywhere quite immovable. The walls of the colon were as hard as stone, and nodular. The peritoneal surface of the bowel was covered

over with small pink tubercles, and there was much ascites. The wall of the cæcum was greatly thickened; but not in the same way as the rest of the bowel. The lumen was evidently patent, because the bowels had acted occasionally for some weeks, and slightly the day before the operation. The small bowel was normal.

Colostomy could not be performed; but a Paul's tube was tied into the cæcum with difficulty. The patient died, but no post-mortem was obtainable. A similar case was under the care of my colleague, Morgan, at St. Mark's Hospital. The patient, a man, aged sixty-two, was admitted



FIG 202.—X-RAY PHOTOGRAPH OF A CASE OF HYPERPLASTIC TUBERCLE OF THE COLON ("GAS-PIPE COLON") (MORGAN'S CASE).
The upper shadow on the left shows a fistula into the duodenum.

complaining of abdominal pain and diarrhœa. He had been unwell for about a year, and was much wasted and anæmic. X-ray enema examinations showed great narrowing of the colon above the splenic angle. At operation the ascending and the transverse colon resembled a rigid tube. An ileo-sigmoidostomy was performed.

The patient recovered from the operation, but died five weeks later. Fig. 202 shows the X-ray appearance. Several sections of the colon wall were examined, and showed unquestionable evidence of tubercle.

In Lartigau's case the patient was a man, aged forty-nine, who died

after a three years' illness. The thickening of the bowel wall commenced in the upper third of the ileum, and extended throughout the colon to the commencement of the sigmoid flexure. The wall of the bowel was 2·7 cm. thick, and uniform throughout. The lumen was patent, and contained numerous papillomatous masses. Microscopical sections of the bowel wall revealed fibrous thickening, and sections stained for tubercle bacilli showed them to be present in large numbers. There was no ulceration of the mucosa.

C. Briddon's case was that of a man aged thirty-four, who for twelve years had been suffering from constipation, painful defæcation, and occasional bleeding and tenesmus. This condition had continued with exacerbations. When admitted to the hospital he had six to eight stools daily, which contained blood and mucus, and were offensive. Per rectum an indurated mass could be felt. An attempt was made to perform a left inguinal colostomy, but the colon was found to be generally infiltrated and bound down, so that it was impossible to bring any portion of it into the abdominal wound. An incision was made on the right side, but it was found that the whole colon was similarly infiltrated and fixed. The small intestine was normal, and enterotomy was performed. The whole colon was uniformly thickened, and the thickening terminated in a hard cartilaginous mass at the lower end of the sigmoid flexure. The colon was covered with pinkish-coloured nodules looking like boiled sago.

In J. W. Elliott's case the patient, a woman, had suffered from constipation and dyspepsia for twelve years. The whole colon, from the rectum to the splenic flexure, was a solid tube so fixed that it could hardly be moved.

Treatment.—As already stated, the ulcerative form of tubercle of the colon usually occurs as a terminal complication in advanced phthisis, and there is little possibility of treating it, either by medical or surgical means. Occasionally it may happen that surgical treatment is called for to deal with some serious complication which has resulted from the ulceration, such as intractable diarrhœa, perforation with general peritonitis, and abscess. Colostomy can seldom be of any use in treating the diarrhœa, for the cæcum is almost invariably involved. Appendicostomy might be of value in controlling the diarrhœa by enabling the colon to be washed out periodically, and it has the advantage that it is an operation of so little severity that it could easily be performed in cases where the patient is seriously ill with phthisis without grave risk. I do not, however, know of any case in which it has been done.

The Treatment of Hyperplastic Tuberculosis of the Colon.—This condition is so rare and so little known that it is very seldom a correct diagnosis is made previous to operation. The abdomen is generally opened to relieve obstruction, or to explore a tumour supposed to be malignant. Even

	Cases.	*Deaths.*	*Mortality per Cent.*
Immediate end-to-end anastomosis	39	7	17
Closure of ends and lateral anastomosis or implantation	18	3	16
Preliminary colostomy performed or ends brought out after excision	9	3	33

In three cases lateral anastomosis was performed first, and the tumour resected later. In twelve, where the stricture was resected, the subsequent history was traced for a year or more after operation.

Contra-indications to operation are:

1. Extensive pulmonary tuberculosis, with high temperature.
2. Marked albuminuria.
3. Severe diarrhœa, showing the presence of extensive ulceration.

After operation, the patient should be put under medical treatment and carefully watched to prevent further tuberculous trouble, in the same way as would be done in a case of pulmonary tubercle.

CHAPTER XXX

OBSTRUCTION OF THE COLON

Acute Obstruction of the Colon.

Acute obstruction of the bowel is certainly one of the most serious surgical emergencies that we as doctors are called upon to deal with, and the patient's life will depend upon prompt recognition of the nature of the case and the taking of such steps as will adequately relieve the condition with the least possible delay. The mortality from acute obstruction is still much higher than it should be.

The patient, with very few exceptions, will be suffering from two, and possibly three, distinct conditions. (1) An obstruction to the lumen of the bowel, which prevents any of the contents from passing along the lumen. (2) A toxæmia due to the absorption of poisons generated in the obstructed bowel; this toxæmia, while often not very evident—or at least often obscured by the more obvious results of the obstruction—is a very real source of danger to the patient, and has to be taken very seriously into account in the treatment of the case. (3) If the bowel is strangulated from bands, adhesions, or twists, or any other condition which in addition to causing obstruction of the lumen also causes obstruction to the blood-supply of the affected portion of bowel, then serious damage to part of the bowel wall will be a third factor causing danger to the patient. In a case of hernia or volvulus all these three factors will be present in varying degrees, but in the more usual forms of obstruction, such as stricture, only two of these factors are present.

Diagnosis.—The necessity of making a diagnosis between a case of obstruction of the small and one of the large bowel always arises, but should as a rule not present any serious difficulty. In the first place some 75 per cent. of all cases of obstruction of the small bowel are the result of external hernia, and these, if looked for, as they always should be, will be easily detected, but apart from this the symptoms are usually very different. In small bowel obstruction the symptoms are most acute, and vomiting of the characteristic fæcal type occurs almost from the onset of the crisis. Pain is usually well marked and often severe, and there is little distension in the early stages. Such distension as is present will be in the central part of the abdomen. The appearance of the abdomen in a case of obstruction is often alone sufficient to enable one to distinguish between an obstruction of the small and of the large bowel. In obstruction of the

large bowel distension is usually the chief symptom, and vomiting only occurs late and is never so severe or frequent as in obstruction of the small bowel.

Having arrived at the conclusion that the case is one of obstruction of the large bowel, it is advisable to diagnose, if possible, the cause of the obstruction, or at any rate the probable nature and whereabouts of the obstructing lesion. This is often a matter of very considerable difficulty, but there are a number of factors which will assist us, and the possibility of error, though always present, can usually be reduced to a comparatively small fraction.

In the first place the law of probabilities, which is just as useful in medical practice as it is in playing bridge, will be a great help. If we see a bird on a telegraph wire in a London street it may be a canary, but the probabilities are very great indeed that it is a sparrow. Now by far the commonest cause of obstruction of the large bowel in people over middle age is cancer, and there will therefore be a probability of at least two to one that a tumour is the cause of the trouble. After this the commonest cause is diverticulitis, which probably accounts for more than one-half of the remaining cases. Thus the probabilities offer a very big chance that cancer of some part of the colon is the cause, a considerably smaller chance of diverticulitis, and quite a small chance that some other condition is responsible. This small chance is probably not more than about 10 per cent. If we continue to use the law of probability it will assist us further, as we know that the commonest situation for a cancer of the large bowel is in the rectum or pelvic colon, which accounts for some two-thirds of all cases. The next commonest site is in the cæcum, and after that the splenic angle. We also know that very much the most usual situation for an obstruction due to diverticulitis is in the pelvic colon. We may therefore conclude, before we look for any other evidence, that the chances are very considerable that we have to deal with an obstruction at the lower end of the colon.

An examination of the rectum is the next procedure, as it will tell us whether there is a tumour in the rectum, and in a normal individual we shall be able to feel whether there is any tumour or swelling in the pelvis. If an examination can be made with a sigmoidoscope it will enable us to confirm or exclude the presence of an obstructive lesion at the extreme lower end of the colon, which is the commonest site. An examination of the abdomen will be of some assistance, as we should be able to feel a tumour, if present, in the cæcal region, though it is very unlikely that it will be palpable anywhere else. If, however, diverticulitis is the cause of the obstruction it is most probable that a hard tender swelling will be detectable in the left iliac fossa. The patient's previous symptoms, if any before the onset of the obstruction will also be of value. In cases of

cancer there are almost always symptoms of irregularity of the stools and evidence of blood for some weeks or months. In diverticulitis there will be a history of attacks of pain in the abdomen, usually accompanied by temperature often extending over a considerable period, it may be for some years.

In at least two-thirds of the cases of obstruction of the large bowel it should be possible to diagnose both the nature and the site of the lesion, but there will always remain a residue where an exact diagnosis cannot be established, and these cases call for further consideration. In looking through my case books I find quite a number of cases of obstruction of the colon, of which many were not diagnosable with certainty previous to operation. In two cases a previously undetected megacolon was the cause of an acute obstruction. In one case a correct diagnosis was made and the patient relieved without operation; in the other the patient was put on the operating table and an anaesthetic administered, but the relaxation produced by the latter caused a copious evacuation and relieved the obstruction, and a subsequent examination with a sigmoidoscope established the diagnosis. In two cases the obstruction was caused by adhesions from a chronic appendix abscess deep in the pelvis, which had not been detected, and was not even suspected until discovered at the operation for obstruction of the colon. In three cases the obstruction was caused by acute cellulitic inflammation of a section of the pelvic colon due to diverticulitis. In one case an almost complete fibrous stenosis of the pelvic colon from the same cause was present, and in a number of cases diverticulitis of the pelvic colon was the cause. In some of these the lumen had become so narrow as to get blocked, and in others the colon had become acutely kinked as the result of adhesions to neighbouring structures. Adhesions or bands were the cause of obstruction in several cases. These were mostly due to some previous operation on the abdominal cavity performed many years previously. Hypertrophic tuberculosis was the cause in two cases, and in three cases tuberculous peritonitis in childhood had caused almost complete obliteration of the abdominal cavity, which must have been present for many years without causing serious trouble, but had finally, from the contraction of some particular band of fibrous tissue, caused a complete obstruction. Five cases were due to volvulus. Two of them were cases of volvulus of the pelvic colon; two were due to volvulus of the whole cæcal angle, the twist occurring around the superior mesenteric artery and involving almost the whole of the small intestine and half the colon. These cases are almost invariably fatal owing to the enormous mass of gut involved and the difficulty of untwisting it, but one of these patients survived and is alive to-day. The other case of volvulus was one of the splenic angle. This must be a very rare occurrence, as I have never seen any other case where the splenic

angle was loose enough to be able to twist at all. In this case it was quite loose and had a long mesentery.

There was also one case due to a large stercolith stuck in the lower end of the pelvic colon. It could not be diagnosed, as there was so much œdema below it that it was not possible to feel it, or see it with the sigmoidoscope, although, of course, a swelling could be felt which was thought to be a growth. In one case the obstruction was due to a large submucous lipoma in the pelvic colon.

Treatment.—Immediate operation is called for in all cases, although there is no harm in administering an enema, which may possibly relieve the immediate symptoms, and, in a few cases, such as megacolon, may relieve the obstruction entirely. The operation will always be an anxious and dangerous one, owing to the patient's condition. The chief dangers are vomiting while the patient is under the anæsthetic, and toxic shock. It often happens that when the abdomen is opened there is sudden fæcal vomiting, and if the patient is deeply under the anæsthetic some of the vomit gets into the lungs and causes a fatal broncho-pneumonia. This can be guarded against by passing a stomach-tube directly the patient is unconscious, and before commencing the operation. The stomach may be either washed out or allowed to drain during the operation, and washed out before the patient leaves the table. A still better method is to do the operation under local or spinal anæsthesia, so that the coughing reflex is not abolished. The prevention of toxic shock is more difficult. The administration of large quantities of water or saline so as to dilute the poisons and encourage their elimination is most important, but this is not easy. If the patient is not being sick, it can be administered by the mouth, but if there is sickness this is impossible, and if the obstruction is low down rectal salines will probably not be retained. It is often necessary to give subcutaneous or intravenous saline, and this should always be done in a bad case before or during the operation. Glucose, or some other form of sugar, should also be given by the most convenient route.

As regards the operation itself, all surgeons are agreed that "to get in quick and get out quicker"—the famous motto of the late Professor Murphy of Chicago—is even sounder in cases of acute obstruction than it is in cases of acute peritonitis, for which it was originally invented. One should do the least possible that will relieve the obstruction, and leave direct interference with the lesion to a subsequent operation when the patient has got over the toxæmia which has been produced by the obstruction. Some years ago, at Bristol, Burgess and I advocated blind cæcostomy in these cases as the best treatment, but there is still considerable difference of opinion on this question. The advantages of blind cæcostomy are that it can be performed under local anæsthesia through a small incision with the absolute minimum of inter

ference with the abdominal cavity, and that it completely drains the whole of the colon above the obstruction and rapidly gets rid of the toxæmia. The opening, if made by the tube method which I suggested in 1922 (see also p. 552), will remain open for ten days to a fortnight, and will close itself without a secondary operation. This gives time enough to perform a second operation to deal with the obstructing lesion. It has been urged against blind cæcostomy that it does not enable a diagnosis to be made of the obstructing lesion, but this is not a serious objection, as it is not the lack of an exact diagnosis that is threatening the patient's life, *but the obstruction.*

While this is, more or less, the general opinion, most surgeons still do an exploratory laparotomy with a view presumably of finding the cause before attempting to deal with the obstruction. This often results in the surgeon getting into difficulties, owing to the distended coils of bowel which are liable to escape from the wound, and are difficult to replace, or to the peritoneum splitting from the tension. There are few operations which give rise to such serious difficulties as an exploratory laparotomy on a patient with acute obstruction of the colon.

It seems to me that there is no necessity or object in doing an exploratory laparotomy at all, and that a much better plan is to be content to simply relieve the obstruction by a temporary cæcostomy and postpone investigation of the cause till later. It has also been pointed out that if the obstructing lesion is a volvulus, it will not be relieved by a blind cæcostomy. This is a more serious objection, but volvulus only accounts for about 1 per cent. of cases of obstruction, and in any case it is generally fatal. It was pointed out by Burgess that if it can be proved that the mortality from acute obstruction of the colon can be reduced materially and as a whole by blind cæcostomy, this is sufficient justification for its adoption.

While surgeons still hold different views as to the advantages of blind cæcostomy in cases of colonic obstruction, they all agree that a colostomy or cæcostomy should be performed above the site of obstruction, and the actual obstructing lesion should not be dealt with at the time, but be left till after the obstruction has been relieved. On no account should any attempt be made to resect the obstruction or to short-circuit it. An occasional successful result from such a procedure is no justification for the very serious risk involved. The subsequent treatment of the patient should aim at getting rid of the toxæmia by freely administering water in some way or another and relieving the overloaded bowel. It is generally better to evacuate the bowel by means of enemas given through the artificial opening rather than by administering purgatives by the mouth.

When a temporary cæcostomy has been performed for a case of acute obstruction, there will often be a mass of semi-solid fæcal matter above the obstructive lesion, and between it and the cæcostomy. While the tube

in the cæcum will relieve the obstruction, it is hardly reasonable to expect that all the accumulated matter in the colon will be evacuated through the tube unless something is done to assist it. I have found the best procedure is to introduce into the colon, through the tube, from ½ to 1 ounce of *magnesium sulphate dissolved in a few ounces of warm water*. This has the effect of liquefying the contents of the colon and enabling it to pass backwards and come out through the tube. Also, as the result of relieving the tension by performing cæcostomy, the obstruction itself is partly relieved, and much of the contents often passes on. By repeated enemas of magnesium sulphate or oil, administered through the tube and per rectum, it is generally possible to completely clear the whole colon in the course of a few days. This should always be done before proceeding to open the abdomen for the purpose of dealing with the cause of the obstruction.

Thrombosis or Embolism of the Colic Bloodvessels.

Embolism of one of the main arteries of the colon, or thrombosis of the veins, results in complete obstruction. The contents of the colon are arrested and the bowel above becomes distended. Thrombosis is a very rare condition, and is but seldom diagnosed during life, except as the result of an operation for the relief of obstruction.

The onset of symptoms is in all cases sudden, and it soon becomes obvious that there is some serious intra-abdominal mischief.

While this is the normal type of case, there appear to be some in which the obstructive symptoms are not so marked. Thus, the first symptoms may be sudden abdominal pain, followed by diarrhœa with blood and mucus in the stools. The blood may be bright in colour, though more usually it is dark.

The symptoms produced by embolism or thrombosis are those of intestinal obstruction, and it is not possible to make a correct diagnosis unless there is some reason to expect embolism. Exactly why an infarcted portion of the colon should produce obstruction it is not easy to see; but it apparently acts as a complete block to the passage of the intestinal contents, and the bowel above becomes dilated as if a stricture were present. When seen, the appearance of the bowel is characteristic. It is of a dark chocolate or purple colour, and in marked contrast to the surrounding healthy bowel. When laid open, the mucous membrane is seen to be purplish in colour and œdematous.

For the notes of the following case, which well illustrate this rare and interesting condition, I am indebted to Littlewood of Leeds.

The patient was a woman, aged sixty-four. She was much wasted. There was a history of several days' complete intestinal obstruction, with fæcal vomiting and some abdominal distension. There was no

history of melæna, and no evidence on examination of any cardiac lesion.

An exploratory laparotomy was performed. The patient was very ill, and died on the operating table. A post-mortem examination revealed in the left half of the transverse colon a portion of about 2½ to 3 inches in length which was thickened and œdematous. The corresponding portion of mesocolon was similarly thickened, and both this and the bowel wall were markedly injected. On opening the gut, the mucous membrane was seen to be of a chocolate colour and slightly swollen. The affected portion of mucous membrane was, owing to the change in colour, sharply marked off from the normal mucosa. There was well-marked venous dilatation.

Thrombosis was discovered. One small artery near the bowel contained blood-clot, but the clot was not apparently attached to the vessel wall. The colon was distended, and the discoloured portion of the transverse colon marked the junction between the distended and collapsed portions of bowel. The cæcum was greatly distended, and there was distension of the ascending and right half of the transverse colon; but the distension terminated at the discoloured portion of bowel, and the descending colon was collapsed.

The remainder of the intestine was quite normal, as were also the other abdominal organs.

The following case was reported by H. T. Gillett:

Case.—A woman, aged forty-nine, who had for some time been suffering from piles, was seized in the night with abdominal pain. This was followed by diarrhœa, which became markedly blood-stained in forty-eight hours from the onset. At this time the stools consisted of almost pure blood. On the third day nausea and severe abdominal pain were the chief symptoms. The pulse and temperature were normal. The abdomen was opened at the end of the third day, and the transverse colon was found to be dark purple in colour and much thickened. The ascending and descending portions of the colon were anastomosed, but the patient died two days later, apparently from toxæmia.

Post-mortem The transverse colon was purple in colour, much thickened, and the lumen reduced in size. There were numerous small hæmorrhages in the bowel wall. No clots could be discovered in the branches of the colica media. There were hæmorrhages in the transverse mesocolon. There was an old mitral lesion in the heart, with some vegetations.

I recently had a patient who suddenly developed thrombosis of the superior mesenteric artery. The greater part of the colon was completely gangrenous, and it was quite impossible to do anything. The cause of the thrombus was not discovered.

Infarct of the colon is a rare condition, and is usually fatal.

Early operation would appear to afford the only chance of saving the patient's life.

Treatment.—When an extensive area of colon is involved, it is unlikely that any operative or other treatment will avail. But if the infarcted area is not large and operation is performed early, resection of the whole damaged area of bowel will probably save the patient's life. It would seem advisable to perform resection rather than short-circuiting, as the latter operation does not remove the cause of the toxæmia.

It is unlikely that the condition will be diagnosed previous to operation; but as the symptoms are those of intestinal obstruction, a condition calling for immediate operative interference, this is not a serious obstacle to a successful result.

CHAPTER XXXI

CANCER OF THE COLON

Diagnosis.—The diagnosis of cancer of the colon in its early stages presents many difficulties. No direct evidence of the presence of a growth is available, the colon is not palpable through the abdominal wall unless a very gross lesion is present, and except at its extreme lower end the colon cannot be seen. Diagnosis, therefore, can only be made by indirect means—that is, by what we might call circumstantial evidence.

Twenty-five years ago no attempt was made to diagnose obstructive *lesions of the colon until symptoms of acute obstruction had supervened.* The diseases of the large bowel were more or less of a mystery, and their diagnosis was mostly pure guessing. Since then a great many aids to the diagnosis of conditions in the colon have been invented and perfected. The accurate diagnosis of disease in the colon is still uncertain and open to great improvement, but modern methods have made it possible to recognize colonic lesions with considerable accuracy, and to-day the great majority of chronic obstructive lesions are diagnosed correctly long before the onset of acute symptoms. This is a great advance, and has entirely revolutionized the treatment of these conditions.

It must be admitted that our means of diagnosing such cases in the early stages are most inadequate at the present time, and it is only by most careful consideration of several different methods and careful weighing of the evidence that we can hope to arrive at any definite conclusions.

The methods at our disposal are as follows: (1) The clinical history. (2) Laboratory tests. (3) X-ray examinations. (4) Sigmoidoscopic examination. (5) Bimanual examination of the pelvis either per rectum or per vaginam.

The normal colon passes its contents along in about sixteen to seventeen hours. The residue of a normal meal taken by the mouth reaches the cæcum in approximately four hours, and takes another sixteen or seventeen hours to reach the rectum. There are, of course, considerable variations in different individuals, and as the result of different food in the same individual. Excessive peristalsis may cause much more rapid emptying of the colon. Among such causes may be mentioned: (1) The presence of a foreign body. (2) Inflammation or any local irritative lesion. (3) Certain drugs or foods, notably ergot. (4) Excess of carbonic acid in the blood; this is well seen in the contraction occurring in the

intestine in asphyxial conditions. (5) Fear, extreme nervousness, or fright of any kind, will in some individuals cause immediate diarrhœa. This form of diarrhœa was so common, as the result of air raids in London during the war, that it used to be called "air-raid diarrhœa."

Causes of delay in the passage of the fæcal contents are: (1) Obstruction of the lumen; (2) lowered vitality; (3) dehydration of the tissues; (4) damage to the nerve supply of the colon; (5) interference with the blood supply; (6) certain drugs.

Any condition which causes delay in the passage of the colon contents will have certain definite consequences. Fermentation or decomposition of the fæcal contents due to micro-organisms always occurs in the colon, but if there is delay the decomposition will become excessive and gas will form in large quantities and cause distension. There is no doubt that the chief function of the colon is the absorption of water from its fæcal contents. While this is not an important function to civilized man living in cities with an unlimited water supply, it is still of importance if long journeys have to be taken where water is scarce, and at one time must have been of vital importance. A certain amount of digestion probably takes place in the cæcal end of the colon, but this does not appear to be very important. Certain substances are excreted by the colon. Patients whose colons have been removed are particularly susceptible to certain drugs, such as arsenic and mercury, and also some of the alcohols, such as ether and chloroform.

When, as the result of some lesion within or without the colon wall, the lumen is partly obstructed, the blood-supply is restricted or the peristaltic muscle wave interfered with, certain definite alterations of function occur. Partial obstruction of the colon lumen results in considerable delay in the passage of the fæcal content and in the slow accumulation of such content above the obstruction. The first effect will be to increase the time which the fæcal material takes to pass through the colon, and to produce what is generally called constipation; very soon, as the result of the irritation set up by the delayed contents above the obstruction and by the constant leakage of small quantities past the obstruction, the bowels begin to act with unnatural frequency and an irritative diarrhœa is set up, in spite of the fact that considerable delay in the passage through the colon is still taking place.

At the same time the decomposition of the delayed residue gives rise to distension of the gut with gas, especially above the obstruction. With a partial obstruction these processes occur very slowly and often intermittently, depending on the quantity and quality of the food taken and the measures used for the relief of symptoms.

If the blood-supply of the colon is restricted, as is the case in volvulus of the sigmoid and in mesenteric thrombosis, very rapid distension of the

affected loop of colon takes place, and later severe poisoning from the absorption of the decomposed contents through the damaged colon wall.

When the peristaltic wave is interfered with by disease or injury, the results are very similar to those caused by an obstruction of the lumen, but occur more slowly and distension is less evident. Marked hypertrophy of the muscular wall of the colon above the damaged area ultimately develops. As a rule, when disease affects the colon, more than one of these factors are present at the same time.

It is very obvious that if we are to diagnose obstructive lesions of the colon before the actual onset of obstructive symptoms we must be able to recognize the danger signals at a very early stage, so that further tests may be applied to confirm or allay our suspicions.

A common early symptom is some slight irregularity of the bowel actions as compared with the patient's previous habit. Thus a patient who has been accustomed for many years to have one action of the bowels after breakfast may say that he now has to take an aperient fairly frequently, and that his bowels act two or three times a day. Such irregularity may be only temporary, but may return again in a few weeks.

These symptoms are probably due chiefly to irritation from the ulcerated surface, and partly to interference with the normal muscular movement of the affected part of the bowel wall. It cannot be too strongly insisted upon that constipation alone is a very unusual early symptom.

Pain or discomfort in the abdomen is often an early symptom. The pain may either take the form of occasional attacks of colic, or of a more or less constant sense of abdominal discomfort, often described as a dull, dragging pain. Flatulence, requiring the constant passage of wind, is another early symptom in some cases.

Bleeding is sometimes an early symptom of cancer, and is due to the ulcer having perforated one of the small arteries in the bowel wall. When this happens the bleeding is quite profuse, several stools being passed consisting of nothing but blood. Hæmorrhage, however, only occurs as an early symptom in some 5 per cent. of growths. The blood is either quite bright in colour, or is in the form of large, partly changed clots, depending, of course, upon the time it has been retained within the colon. It is, however, not digested, and in this contrasts with the appearance of blood coming from the stomach or duodenum. Vague recurring discomfort in the abdomen is a common symptom, but may not be referable to the colon, but rather to the stomach. Thus the patient may complain of dyspeptic symptoms or loss of appetite. Careful inquiry will generally elicit the fact that the discomfort occurs some hours after meals. Flatulence of a tiresome character is sometimes an early symptom. It may happen that the earliest symptom is a partial obstruction from fæcal impaction Complete relief results from enemas or an aperient, and no

further importance is attached to the happening, but one should always ask oneself why a healthy person should get an impaction; it does not occur in a normal bowel, except possibly in the aged. Excess of mucus in the stools may occur, and has sometimes been the first symptom noticed.

A marked degree of anæmia sometimes occurs in growths of the colon, more particularly at the cæcal end, and may be the first symptom noticed. The degree of anæmia may be such as to give rise to a diagnosis of lead poisoning or pernicious anæmia. No satisfactory explanation of this anæmia has yet been put forward. It always clears up after removal of the growth.

Some often-quoted symptoms are quite valueless, and may cause mistakes if any importance is attached to their presence; thus, loss of weight, cachexia, and alteration in the shape of the stools can be present only

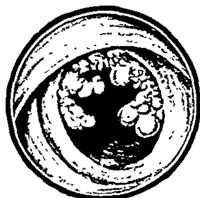


FIG. 203.—TUMOUR HIGH UP IN THE SIGMOID FLEXURE (SIGMOIDOSCOPIC).



FIG 204.—MALIGNANT GROWTH AT THE LOWER END OF THE SIGMOID FLEXURE GROWING FROM THE ANTERIOR BOWEL WALL (SIGMOIDOSCOPIC).

in very advanced cases, and are perfectly valueless as a means of diagnosis.

It is obvious that all the symptoms enumerated are so comparatively insignificant, and so common in other and less important conditions, that it would be quite wrong to found a diagnosis upon them. They are none the less of great importance in that the presence of such symptoms should indicate the necessity for more detailed investigation to negative or confirm the diagnosis. It is only by attaching proper importance to these symptoms that we shall have an opportunity of utilizing more exact methods to arrive at a diagnosis.

It was at one time thought that valuable results would be obtained by a careful examination of the stools in cases of suspected disease of the bowel, but it must be confessed that the results have been disappointing. The bacterial flora of the large bowel is so numerous and varies so greatly that it is hardly to be expected that any characteristic changes will be

discoverable; in fact, the results are very confusing and generally valueless.

The only test of value is that for occult blood in the stools. Cancers of the large bowel ulcerate at a very early stage, and when ulceration occurs small quantities of blood-corpuscles must constantly find their way into the fæcal contents. The identification of occult blood in the stools of a patient suspected of having a cancer in the colon would be of the greatest value if it could be relied upon.

The chief tests for small quantities of blood in the fæces are: (1) Microscopic examination for red blood-corpuscles. (2) Chemical tests for occult blood. (3) Spectroscopic tests for blood-pigment (see pp. 389 and 390).

In all cases in which a positive reaction to these blood-tests is obtained when the patient is on a full diet, the test should be repeated after the patient has been on a vegetarian diet for three or four days. When judging the significance of a positive blood-test the other sources of blood, such as non-malignant ulceration and internal piles, must be considered. The plan of taking a small piece of fæces with crocodile forceps from high up in the sigmoid through the sigmoidoscope is the method which should be adopted when practicable.

A sigmoidoscope examination is of the greatest value. If the colon has previously been cleared it is possible to see well up into the pelvic colon. As the pelvic colon is the commonest situation for malignant growths of the bowel it will often enable a positive diagnosis to be made, as apart from actually seeing the growth a small portion can be removed with a suitable instrument, and will enable a skilled histologist to identify the nature of the growth. Fixation of the pelvic colon can also frequently be demonstrated by this means with the sigmoidoscope.

Palpation of the abdomen and bimanual examination of the pelvis with one finger in the rectum or vagina often affords most valuable information if carefully carried out. Tumours in the pelvic colon can often be felt in this way, but in other parts of the colon palpation will seldom enable a tumour to be felt unless it is a considerable size, as the colon is for the most part very deep-seated.

One of the most valuable means of making a diagnosis at our disposal is a barium enema. A barium enema examination, if carefully done, will outline the whole colon, and will very often demonstrate an early obstructive lesion. The examination should always be repeated at least once to avoid accidental appearances which are very liable to occur. A marked alteration in the normal outline of the colon, or the presence of a definite filling defect, if present in successive examinations, is of great value. When there is reason to suppose that spasm may be the cause of the appearance, the administration of atropine or belladonna before the administration of the enema will enable this source of fallacy to be overcome.

Very satisfactory evidence of lesions in the colon can be obtained in this way, but there are very many fallacies. It is only when the photographs are taken with great care and repeated that one can rely upon the findings. Even when every care has been exercised we must remember that we are only photographing shadows, and too much trust in them is unsafe.



FIG. 205.—X RAY OF BARIUM MEAL, SHOWING FILLING DEFECT IN ASCENDING COLON.

This appeared in repeated photographs, and at operation was found to be due to a carcinoma.

The charcoal test which I suggested many years ago is a rough but sometimes useful guide which can be very readily used, and does not necessitate any apparatus or special skill. It consists in giving the patient a fairly large dose of charcoal (*Carbonis ligni*) with his or her breakfast, and observing when the black colour of the stools is first observed. A couple of teaspoonfuls of powdered charcoal in an ounce or

two of milk is a convenient way of administering it. In a normal person the charcoal should appear in the stools the next morning, or at any rate the next day, and should have almost disappeared the following day. Slight variation may be discounted, but if two or three days elapse before the appearance of the charcoal, and if it continues to appear for several days afterwards, it is clear that there is abnormal delay in the passage of the colonic contents, which requires further investigation.

None of the methods mentioned of making a diagnosis can be relied upon solely with any degree of certainty in making a diagnosis of a growth in the colon, but if, after a careful consideration of all the evidence thus



FIG. 206—X-RAY PHOTOGRAPH, SHOWING FILLING DEFECT IN THE TRANSVERSE COLON DUE TO CARCINOMA (BARIUM ENEMA)

accumulated, there is a reasonable probability that a growth is present, then we must be prepared to err, if at all, on the side of safety and advise an operation. It is obviously much better to do an unnecessary operation than to miss a lesion which may ultimately cost the patient his life.

The greatest difficulty arises in diagnosing cases of early carcinoma of the colon by the X rays. Negative results—that is to say, failure to find a filling defect or abnormal points of outline in the colon—cannot be taken as proving that there is no growth present. I have on many occasions found growths in patients who had been assured on such X-ray evidence that nothing was there. The filling defect, if present, will often have a double outline if due to a cancerous ulcer, as the greatest narrowing occurs

at the upper and lower edges of the ulcer. If the growth is of the papillomatous variety and projects markedly into the bowel lumen, the filling defect will tend to have a curved outline with the concavity of the curve towards the growth. A distinct and well-marked notch in the wall of the colon with some fixation of the wall may be all that is seen in some cases. Saltzstein, in a study of 166 cases, found there was an error of 22 per cent. —that is, this proportion of cases were diagnosed as free from cancer by X rays, though a growth was found later.

In a few instances the first thing to draw attention to the growth is the presence of a tumour in the abdomen. This is more often the case when the growth is in the cæcal region, as here a growth may reach a considerable size before any symptoms sufficient to draw the patient's attention to his condition have arisen. Although it is fairly easy to make a diagnosis of cancer of the colon when a palpable tumour is present, it is of the utmost importance that the diagnosis should, if possible, be made before this, as by the time a tumour has reached a sufficient size to be palpable the best time for its removal has probably passed.

It cannot be too strongly emphasized that if cancer of the colon is to be successfully treated, it is necessary that patients should be carefully examined directly there are any symptoms the least suspicious of that condition.

Site of the Growth.—By far the commonest situation for a cancer of the colon is in the pelvic colon. We do not know the reason for this. It has been suggested that irritation produced by the presence of retained fæcal contents is the cause, but there is very little real evidence to support such a view. The following table shows the site of the tumour in 560 cases collected from a variety of different sources. It is useful, as surgeons still have to rely not infrequently upon the law of probabilities in arriving at a diagnosis.

TABLE OF 560 CASES OF CARCINOMA OF THE COLON.

Situation	*Number of Cases.*	*Percentage*
Sigmoid	279	49·8
Descending colon	30	5·3
Splenic flexure / Transverse colon / Hepatic flexure	121	21·6
Cæcum and ascending colon	126	22·5
Appendix	4	0·7

It must be noted that since by far the largest percentage of cancers occur in the pelvic colon, careful sigmoidoscopic examination should make it possible to arrive at a positive diagnosis in a large proportion of cases.

Pathology.—With very few exceptions cancer of the colon is adenocarcinoma, and shows the typical appearances (see p. 307). The tumour

may be of the papillomatous type projecting into the bowel lumen, with much overgrowth of tissue and even semi-pedunculated, or it may be of the ulcerative type with much infiltration of the deep tissues and very little projection into the lumen. In what is often called the scirrhous type of growth there is not much tumour, but a great deal of fibrous tissue, which results in a very tight stricture, looking as if a piece of string had been tied round the bowel. If the tumour has undergone colloid degeneration there is a hard, firm thickening of the bowel wall, but very little projection into the lumen.

In a very large proportion of cases the initial tumour is not cancer, but a simple adenoma of the mucous membrane, which, after existing for a time in a simple form, begins at one part to undergo malignant change, and then quickly becomes converted into a cancerous tumour (see Chapter XVII., on precancerous tumours). The moral, of course, is that all adenomata of the colon should be at once removed, but unfortunately they do not as a rule give rise to symptoms, and are only discovered more or less accidentally.

Carcinoid of the Colon.—This is a very rare form of tumour which is sometimes found in the colon. The commonest situation is at, or close to, the ileocæcal valve. This tumour grows in the deep part of the mucous membrane, and there may not be any ulceration into the lumen. The tumour grows very slowly, and although malignant in the sense that it invades the glands and causes metastasis in other organs in some cases, it is of a low grade of malignancy. In many cases it appears to behave like a simple tumour, and not to invade the lymphatics. Stewart and Taylor found only eighteen cases of carcinoid tumour with metastasis, and I have recorded two other cases since.

Case.—The patient was a lady, aged seventy-six, with a large palpable tumour in the cæcal region. On opening the abdomen a hard, firm mass was felt behind the cæcum. Nothing definite could be felt in the cæcum itself. There were several small secondary apparently carcinomatous nodules in the peritoneum, one on the small intestine about 4 inches from the ileocæcal valve, one on the under-surface of the liver, and two on the cæcum itself. The main mass was in the glands adjacent to the cæcum. The cæcum was carefully stripped up from the right iliac fossa, together with the mass behind it, which was shelled out of the cellular tissue. The ileum was divided about 5 inches away from the cæcum, and the large gut was divided close to the hepatic angle. The whole of the cæcal angle and ascending colon were removed, and the end of the ileum was implanted into the end of the large gut. The patient made a perfect recovery without any bad symptoms.

Pathological Features.—On opening up the specimen removed at operation the posterior margin of the ileocæcal aperture was found to be

occupied by a hard mass, which constricted the lumen of the ileum and projected into the cavity of the cæcum. The mucous coat of the bowel was intact, but adherent to the tumour; there was no ulceration. On section the tumour was greyish-yellow. Immediately behind the ileocæcal valve there was a hard, oval mass, 1½ by 1 inch, consisting of enlarged lymphatic glands which were greyish-yellow on section and necrotic in the centre.

On microscopic examination the tumour of the ileocæcal valve, the mass of glands behind the ileocæcal aperture, the nodules on the peritoneal surface of the ileum, and the glands of the appendix mesentery all showed the typical appearances of a basal-celled cancer or carcinoid tumour. The primary tumour, situated at the ileocæcal opening, occupied the mucous

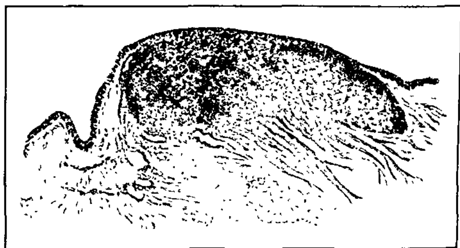


FIG. 207.—MICROSCOPIC SECTION OF THE COLON WALL AND ILEOCÆCAL VALVE SHOWING A CARCINOID TUMOUR.

There is no ulceration of the mucous membrane.

and submucous coats, and infiltrated the muscular coat: the mucous membrane was not ulcerated. Both primary and secondary tumours gave the argentaffin reaction of Masson.

Case.—My other case was a man, aged thirty-six, who was sent to me as a case of sarcoma of the cæcum. The tumour had been explored abroad, and nothing had been done beyond taking a specimen of the tumour for microscopic examination. On examining this specimen it was found to show the typical appearances of carcinoid, and I decided to attempt its removal. The whole cæcal angle and the glands behind it were removed, together with a piece of the liver to which the tumour was adherent, and also part of the anterior stomach which was also involved. The operation was a very extensive one, but the patient made a good recovery and was quite well when seen two years later.

The specimen showed that the tumour was a carcinoid arising in the cæcal wall and invading the lymph glands, liver, and stomach by direct extension. There was no evidence of metastasis.

The fact that both these patients survived operation for many years, in spite of the extensive invasion of other tissues, would seem to show that the prognosis in such cases is much better than in the case of adenocarcinoma. *Without a microscopic examination these tumours may easily be diagnosed as sarcoma.*

Growths in the colon are almost always primary, but cases have been recorded of the colon being the seat of metastasis from other organs. A case is recorded by Sir William Arbuthnot Lane of a growth in the pelvic colon and another in the rectum which were secondary to a carcinoma of the breast. I myself recently operated upon a lady with an obstructing growth in the ascending colon, which on microscopic examination proved to be secondary to a breast cancer which had been removed from the left breast five years previously. Multiple primary tumours of the colon are sometimes met with. I have seen as many as three primary cancers in different parts of the colon at the same time. Norbury collected nineteen cases of multiple primary tumours of the rectum, or colon and some other part.

	Cases
Rectum and colon	11
Colon and cæcum	2
Colon and stomach	2
Colon and jejunum	1
Colon and œsophagus	1
Both in colon	2

Indications for Operation.—When a growth is diagnosed, or even suspected, there is, of course, no question as to the correct procedure. An operation with the object of freely resecting that portion of colon containing the lesion affords the only hope of saving the patient's life. The results of resection of the colon for cancer, apart from growths at the lower end of the pelvic colon, are among the best that surgery has to show in the treatment of this dreadful disease. When resection and end-to-end anastomosis can be performed the restoration of function is perfect, and the patient is left without any disability. Further, the liability to recurrence is very slight, as compared with cancer in most other situations.

Sarcoma of the Colon.—This is a very rare form of disease of the colon, and, as one would expect, the patients are younger as a rule than is the case with cancer.

The ages in seven cases were as follows:

1 Male, age 17
2. Female, „ 50.
3 Male, „ 12
4. Female, „ 21.
5 Male, age 8.
6 Female, „ not stated.
7. Female „ 5.

In all these seven cases the growth was in the cæcal region. It is generally a fusiform-celled sarcoma, but in one case it was myxo-sarcoma, and in one a fibro-sarcoma. Verebely, in 106 cases of sarcoma of the large bowel, found the lesion located as follows: Appendix 36, transverse colon 11, sigmoid 55, rectum 4. Sarcoma differs markedly from cancer in appearance, as it looks as if it had invaded the bowel wall from outside. The mucous membrane is at first intact, and is stretched over the tumour. It originates in the interstitial tissues of the bowel wall, and tends to spread along the submucous and subperitoneal layers both circularly and longitudinally. In cut sections these two layers are seen to be greatly thickened and to consist entirely of sarcomatous tissue. The growth does not affect the mucous membrane early, and it does not tend to ulcerate into the bowel lumen. In some, the growth seems to spread along the bowel, forming a tubular stricture, and forms outgrowths or tumours under the peritoneum; while in others it tends rather to spread into the bowel and form a large tumour filling up the lumen.

The growth may apparently start in the subperitoneal layer, and in one patient almost the whole growth was outside the muscular coat. Marked ascites due to involvement of the peritoneum was present in one of the cases.

The Lines of Extension of the Growth in Cancer of the Colon.—The study of the directions and ways in which cancer of the colon extends is of the utmost importance, for unless these are known it is not possible to so plan an operation as to be reasonably certain of removing the entire growth. And it is only when operations for cancer are planned according to the known methods of extension of the growth that really successful results can be obtained. The lymphatic spread tends to take place along the line of the main bloodvessels. Thus, in the lower part of the pelvic colon, the spread will be towards the inferior mesenteric artery and up along the aorta, while in the rest of the colon it will be towards the origin of the superior and right colic arteries. Tumours of the splenic angles sometimes spread along the splenic vessels, and there are sometimes communicating lymphatics in this position.

As already stated, cancer when it affects the colon tends for a long time to remain localized to the bowel wall, and it is exceptional to find the glands in the mesocolon, and especially the retro-peritoneal glands, involved, except in very late cases. Out of thirty cases in which glands were specially looked for, enlarged glands were present in the mesocolon in only five, and retro-peritoneal glands in only three cases. In only two cases was there a secondary deposit in the liver. The thirty were all cases in which an operation had been performed, and not those reaching the post-mortem table after dying from cancer. Of course, a much higher proportion of secondary deposits would be found if cases of advanced and inoperable disease were taken.

At the stage when cancer of the colon is usually detected, enlargement of the glands in the root of the mesocolon and behind the posterior peritoneum is exceptional, the growth tending rather to spread in the bowel wall, and to involve only those glands in immediate contact with it. We are too apt to assume, because enlarged glands are found in the neighbourhood of a malignant growth, that they are therefore the seat of cancer cells. Frequently, however, this is not the case.

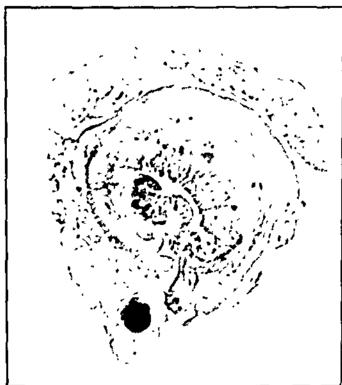


Fig. 208.—Cancer of the Sigmoid Flexure

A transverse microscopical section of the colon through the centre of the growth. The gland in the lower edge does not show any cancer cells. The growth is spreading in the submucous layer.

(Photograph from a specimen prepared by Sir Lenthal Cheatle.)

While enlarged glands are not uncommonly present in immediate proximity to the growth and in the fat around the bowel, they are not very common at the root of the mesocolon or in the retro-peritoneal tissue; and in many cases the glands that are enlarged are not cancerous. Grey Turner has also drawn attention to the fact that enlarged glands in the neighbourhood of growths of the colon are quite often only inflammatory, and their presence should not deter the surgeon from attempting removal of the growth. While there are certainly exceptions, as a rule cancer of the colon grows very slowly, and seldom gives rise to secondary deposits in glands or other viscera.

Cancer of the Sigmoid Flexure.—This may occur in any part of the sigmoid flexure; but the commonest situations are at about its centre—that is to say, at the apex of the loop and at the recto-sigmoidal junction. The tumour may become adherent to the bladder in a man, or in a woman to the uterus or left Fallopian tube or ovary. Obstruction tends to occur relatively early, and hæmorrhage is a not uncommon symptom. Cancer of the sigmoid may be associated with diverticulitis, though the association is probably fortuitous and not cause and effect. The difficulty of distinguishing between these two conditions is often very considerable, and apart from examination of cut sections may be impossible. It is well to bear this in mind when operating upon a doubtful case.

Secondary Results of Cancer of the Colon.—Intestinal obstruction is by far the commonest of these, and may be said to occur in almost all cases. It is often the symptoms of obstruction which first call attention to the disease. The obstruction is never complete, and there is always a slight lumen which will allow fluid contents to pass. In many cases it remains partial for a long period, giving rise to the typical symptoms of chronic obstruction, and resulting in hypertrophy and dilatation of the bowel above the stricture. Sooner or later, however, the narrow opening becomes blocked, either from a hard mass of fæces or a foreign body becoming impacted in it, and acute obstruction then sets in. This may also result from a kink occurring as the result of the growth having become adherent to some other organ or structure, or owing to the mesentery becoming shortened from contraction of the fibrous tissue about the growth. Acute obstruction may also occur from intussusception started by a growth in the colon. The late Mr. Barnard found five cases of this condition in the records of the London Hospital. Obstruction occurs earlier on the left side of the colon than on the right. This is due to the nature of the fæcal contents. On the right side of the colon, where the contents are very liquid, the degree of narrowing may be very considerable before signs of obstruction occur.

Ulceration of the growth does not occur at so early a stage of the disease as in the case of rectal cancer, probably owing to the fact that the colon is not so subjected to injury from the passage of hard fæcal masses.

Spontaneous anastomosis occurred in three of the cases in my series. In two the transverse colon communicated with the stomach, and in the other with the ileum.

As a rule the anastomosis is only a small opening, but sometimes it is large enough to allow most of the intestinal contents to be short-circuited.

The two parts of bowel first become adherent at the base of the growth, and then the growth extends into the walls of the adherent viscus. Later, ulceration occurs, and the blood-supply being poorest in the central portion, a communication is established between the two. In a few cases,

however, the communication occurs differently. The growth in the colon becomes ulcerated, the ulcer perforates the bowel wall, and a pericolic abscess forms, communicating by the ulcer with the colon. This abscess

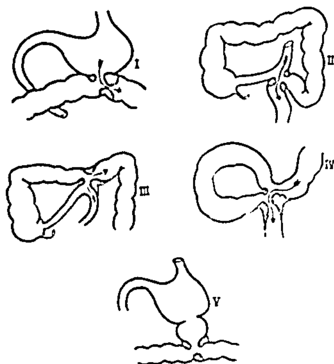


FIG. 209.—DIAGRAMS ILLUSTRATING DIFFERENT WAYS IN WHICH SPONTANEOUS ANASTOMOSIS MAY RESULT FROM A MALIGNANT GROWTH IN THE COLON

I, Anastomosis between stomach and transverse colon. II, anastomosis between ileum and sigmoid flexure; III, anastomosis between ileum and transverse colon; IV, anastomosis between two loops of sigmoid flexure; V, anastomosis by abscess formation between stomach and transverse colon.

then becomes adherent to some other viscus, such as the stomach or ileum, and eventually bursts into it and establishes a communication between it and the colon by way of the abscess.

CHAPTER XXXII

COLOSTOMY, CÆCOSTOMY, AND APPENDICOSTOMY

Colostomy.

THE object of this operation is to make an artificial outlet for the fæces, either temporarily or permanently, by establishing an opening between the skin surface and some portion of the colon.

In the pre-Listerian days, when surgeons were afraid to open the peritoneal cavity, lumbar colostomy was always performed when it was necessary to make an artificial anus, but since the introduction of antiseptic methods it has given place to transperitoneal colostomy.

Colostomy is an operation which in these days should be accompanied by a very small mortality risk, but one must, of course, not confuse the mortality due to diseased conditions for which the operation is performed with that due to the operation itself. In many cases it is performed in an attempt to save the life of a patient who is *in extremis*, and in such cases it not infrequently happens that the patient dies in spite of the operation. Colostomy is an operation that can easily be performed under local anæsthesia. It has for some years been my practice to use local combined with some basal anæsthetic for this operation. The advantages are that the operation can be performed practically without any risk, and there is no fear of sudden fæcal vomiting during the operation in those cases where the patient is suffering from obstruction.

The Operation of Colostomy.—The operation is performed as follows: An incision is made over the left rectus muscle just below the umbilicus, the best position for the incision being about ¾ inch from the outer edge of the left rectus muscle (Fig. 210). The anterior rectus sheath is opened and the muscle fibres separated. The abdomen is then opened, care being taken to keep the incision as small as is compatible with reaching the colon, as the resulting control will be much better where only a small incision has been made. It very often happens that at the same time as the colostomy is performed it is necessary to explore the abdominal cavity, and when this is the case a larger incision should be made, or, alternately, the abdomen can be explored through another incision.

In many textbooks the position for the incision is given as the junction of the middle and outer thirds of a line between the umbilicus and the left anterior superior spine. While this incision is directly over the colon, it has the disadvantage that afterwards, when a cup has to be fitted over

the colostomy opening, the edge of the cup tends to ride upon the iliac crest as the patient walks or moves, and this results in leakage and discomfort.

I prefer to make the incision as described here.

There is a distinct advantage in having the incision rather high up in the abdominal wall. Prolapse is less likely to occur afterwards, and also the same incision can be used for bringing out the transverse colon, if this should be necessary. A prolapse is only a form of hernia, and all surgeons know that the lower in the abdominal wall an incision is made the more liable it is to result in a ventral hernia. The same rule applies to prolapse of the mucous membrane from an artificial colostomy opening, and for this reason it is desirable to keep the opening as high as possible in the abdominal wall.

When the abdomen has been opened, the sigmoid flexure is searched for, and a loop of it is drawn out through the wound. Should any difficulty be experienced in defining the large intestine, the best plan is to pass two fingers into the wound, and push them outwards over the inner surface of the abdominal wall towards the left iliac fossa, and then inwards over the parietal peritoneum covering the floor of the left iliac fossa towards the middle line. The parietal peritoneum is in this way traced from the wound outwards, and again inwards towards the mesosigmoid. The first portion of visceral peritoneum reached will be the mesosigmoid, and the first piece of bowel with which the ends of the fingers come in contact will be the large intestine. Any loops of small intestine which are lying in the left iliac fossa are, of course, disregarded. As soon as the fingers are found to pass off the parietal peritoneum on to a piece of bowel, this piece of bowel is caught between the two fingers and dragged out of the wound, and it should certainly prove to be the large intestine. The large intestine is easily distinguished from the small intestine by the fact that it has longitudinal muscle bands, and also appendices epiploicæ. Both these factors are always present, and serve in identifying the bowel. Should there be great difficulty in finding the large intestine, the abdominal incision should be enlarged and a careful search made. A loop of the sigmoid having been found and drawn out of the wound, it should be pulled upon in both directions to determine which is the upper end. The upper end should then be pulled upon until it is tense, and the remainder of the bowel returned into the abdomen.

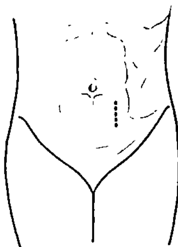


FIG. 210.—INCISION FOR COLOSTOMY THROUGH LEFT RECTUS MUSCLE.

If the colostomy opening is to be permanent, as, for instance, when it is a preliminary to excision of the rectum, it is advisable to make quite sure that there shall be a good spur which cannot in course of time retract. The best way of securing this is to make a skin bridge between the two ends of the colon. The loop of colon should be drawn out and a large opening made in the mesocolon at least an inch wide, and any bleeding vessels tied off. The peritoneum on one side should be stitched with mattress stitches to the peritoneum on the opposite side through the hole

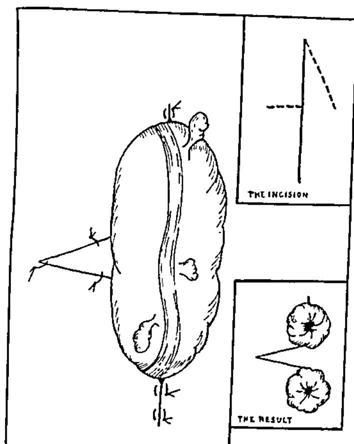


FIG. 211.—COLOSTOMY WITH SEPARATE OPENINGS AND A SKIN BRIDGE BETWEEN.

in the mesosigmoid for about ¾ of an inch. Next the anterior rectus sheath should be similarly stitched to the rectus sheath on the opposite side. The remainder of the wound should next be closed, peritoneum to peritoneum and rectus sheath to rectus sheath, until only sufficient room is left for the two ends of the colon. Care must be taken not to restrict the openings too much so as to endanger the blood-supply. Starting from the upper extremity of the skin incision, a wedge of skin is now separated on the outer side so that its base will be opposite the gap in the mesocolon. On the opposite side of the wound a cut is made in the skin

at right angles to the wound towards the midline for about ¾ of an inch. The apex of the skin wedge is now seized in forceps and drawn through the gap in the mesocolon, and sewn by three or four stitches into the V formed by the incision on the opposite side. *The remainder of the skin wound is* now closed with stitches, and a glass rod put through under the colon, a piece of rubber tubing placed on either end. This completes the operation.

The bowel is not opened for two or three days. It is then opened, preferably by means of a cautery knife, by dividing the colon crossways, and to either end on the outer surface. *This is not painful and requires no* anæsthetic; in fact, the patient will not know what is being done if his eyes are covered over.

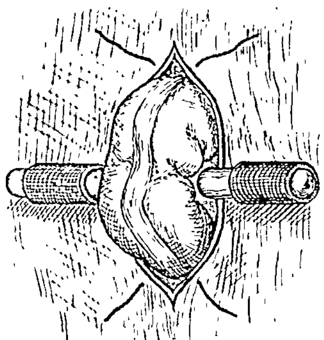


FIG. 212.—COLOSTOMY: GLASS ROD IN PLACE, AND SUTURES AT EACH END READY TO BE TIED.

At one time I used to attach the bowel to the skin by one or two sutures, but I have found this to be unnecessary, and now do not use any sutures.

The important points to remember in order to secure a good colostomy opening are to keep the incision in the abdominal wall as high up as possible, to make certain of having a good spur.

When *the colostomy opening is only a temporary* one, or when it is being done for an acute emergency to relieve obstruction, the opening in the abdominal wall should be as small as possible, and nothing should be done beyond pushing a glass rod through the mesocolon. The only stitches required should be in the skin to close the two ends of the incision, as in Fig. 212.

At the end of about eight to ten days the glass rod should be withdrawn and the colon cut across with scissors. Gauze should be packed between the ends of the colon for a day or two to prevent their healing together again. This should require no anæsthetic, but it is advisable to inject some 2 per cent. novocain into the mesenteric edge of the bowel, as otherwise the patient will complain of pain in the abdomen. There may be slight bleeding which is best controlled by catgut stitches.

The result of the operation will be that there are two orifices, the upper of which communicates with the descending colon, and the lower with the rectum. These openings will be completely separated by a bridge of skin about ½ inch wide, and retraction of the spur will be impossible.

The patient should be instructed to try and get an action of the bowels at the same time every morning, and not to take aperients if he can possibly avoid them. The diet should be as simple as possible, and the patient should avoid those articles of diet which are likely to cause diarrhœa. If there is a tendency to looseness of the stools, or the patient is going on a journey, a dose of the following mixture should be taken and repeated if required:

℞ Bismuth. carb.	gr. xl.
Sodii bicarb.	gr. x.
Tinct. kramer.	ʒss.
Tinct. camph co.	♏ xx.
Tinct. card. co.	♏ xx.
Sp. chlorof.	♏ xv.
Aq. menth. pip.	ad ℥i.

Mitte ℥viii ; ⅛ part for a dose.

It is naturally a great shock to anyone on finding that they are obliged to have an artificial opening for the passage of the bowel contents in place of the one provided by nature. But it is quite a mistake to suppose that such an opening will render them permanent invalids or prevent them from living an ordinary or active life.

Naturally, at first, and before they have got used to it, patients are liable to have occasional accidents from mismanagement, etc., but after a few months, often after a few weeks, they obtain complete confidence, and unexpected actions of the bowel never occur except, perhaps, as the result of gross carelessness. In time they acquire a sense of when the bowel is due to act and have plenty of warning.

Many patients who have colostomy openings live very active lives, hunt, play golf, shoot, dance, dine out, travel, and perform all the other activities of a normal person.

A little patience and practice are required to learn how best to manage themselves, but once this is acquired they should experience little, if any, inconvenience, and no one but themselves and their family need know that they are in any way abnormal.

The following hints for the management of a colostomy opening were written for me by a patient who has had such an opening for over fifteen years, and who has during that period lived a most active and useful life.

Hints for Management of a Colostomy Opening—*Belts.*—The so-called colostomy belt with rubber cup is worse than useless—the cup allows a prolapse of the bowel, and the whole arrangement is grossly messy. The best apparatus *for the patient to wear consists of a belt round the lower* part of the abdomen, that part of the belt which comes over the opening being made of pure smooth rubber, or covered with a layer of thin mackintosh sheeting. There should be a shallow cup made of celluloid, or a plate of the same material to fit over the opening. This cup should be quite separate from the belt, and should have studs on the back of it to keep it in place. The cup should fit directly over the opening. A flat piece of cellulose wool (wood wool) with a hole in it should be placed over this, and then another piece of the same wool without a hole placed over all and secured by the belt. These pieces of cellulose wool should be about 8 inches square. A soft flannel or elastic belt should be used to wear at night and when in bed. For very stout persons, or those with a *tendency to bulging of the opening, a form of belt made like a truss is very* convenient.

The advantage of using cellulose wool is that it can all be thrown down a lavatory without fear of blocking up the drains, whereas cotton-wool must be burnt.

As a rule patients become quite used to a colostomy opening after a month or two; and when they have learnt how to look after themselves and to avoid liquid *stools, most of them suffer very little inconvenience* from the presence of the colostomy opening. They are able to go about as usual, and beyond having to be a little more careful in diet, and having to spend a little more time on the daily toilet, suffer but slight inconvenience from the artificial opening. There are, of course, exceptions in *which the patient suffers a considerable amount of inconvenience, but* these are most often due to the patient not having been properly instructed as to how to manage the opening.

A capsule of kerol (intestinal), 3 minims, which can be obtained from any chemist, if taken before breakfast daily, will absolutely deodorize the excreta and prevent any possibility of an unpleasant odour.

Most people can keep themselves quite clean and comfortable and without any fear of accidents by the foregoing method of management, but a few after a good trial find that the bowel does not act with sufficient regularity. If that is the case, the following alternative method of management is recommended. It is the method mainly adopted by working-class patients who have to be at their job early each morning.

Washing-out Method.—After breakfast, the patient sits on a chair with a slop-pail or other suitable receptacle between his knees and places a piece of mackintosh so as to drain everything from the colostomy opening into the pail. He then takes a long rubber rectal tube, easily obtained from any chemist, which has been lubricated all over with glycerine or soft soap, and passes it into the upper, or business, opening. The tube should be pushed in as far as it will go, but on no account should any force be used. After the tube is in place, a piece of wet wool is packed round the tube where it comes through the opening and held firmly in place with the fingers. The free end of the tube is now attached to a douche-can or Higginson's syringe, and a water enema of about 2 pints is allowed to flow into the bowel through the tube. This should bring away any excreta that have accumulated in the bowel during the previous twenty-four hours. If necessary, the wash-out can be repeated. The skin round the opening is now cleaned up after removing the tube and dusted with baby powder. The pad and plate are then adjusted and the belt put on.

No further action of the bowel should occur until the process is repeated next morning. It is often desirable to wait a few minutes after the wash-out to allow any water to escape before adjusting the pad.

Belts with a receptacle for the excreta are often advised by instrument makers, but they are messy and unpleasant, and quite unnecessary except in a few very special cases.

When the bowel has to be opened at once, the best method is to tie a large Paul's tube into it by means of a purse-string suture, or, better still, by means of a piece of ½-inch tape. To the free end of the tube is attached a long piece of india-rubber tubing, which can be carried over the side of the bed into a pail or other receptacle. These tubes generally remain tied in for about four or five days, after which they will separate unless they are tied in again a little higher up.

Several new methods of performing colostomy have been devised with the object of giving the patient better control over the opening. The earliest of these consisted in giving a twist to the bowel above the opening, or in stricturing it by means of a ligature; these, however, did not prove satisfactory, and have been abandoned. Witzel was the first to suggest making a valvular opening in the abdominal wall. This was done as follows: A loop of sigmoid colon was first brought out through the usual colostomy incision, and another smaller incision was made below the pelvic brim. A space was then opened up between these two incisions by separating the internal and external oblique muscles, and the loop of bowel was dragged through this space and stitched to the skin at the lower opening, the upper opening being completely closed.

Bailey's modification of this method consists in opening up a space

between the skin and external oblique muscle, and bringing the colon out through an incision just above Poupart's ligament (*Fig.* 213).

It is claimed for these methods that, by wearing a truss which presses upon the skin over the bowel where it passes subcutaneously, the patient obtains complete control over both gas and fæces. The opening, however, is placed in a very inconvenient position in the fold of the groin, and the author's experience of these methods has been that the control is no better than that obtained by bringing the bowel straight through the abdominal wall. The valvular opening is good at first, but in a very short time the tension of the bowel straightens out the canal, and if one puts one's finger into the opening it is found to pass straight through the abdominal wall, and all resemblance to a valve has disappeared. The author believes that the best control is obtained by making a small

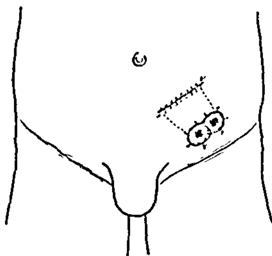


Fig. 213.—Valve Colostomy.

incision and bringing the bowel out through the split fibres of the rectus muscle. When the patient is standing or walking the rectus will be *contracted, and will effectually close the opening and prevent leakage.* Moreover, at any time, by contracting his recti, he can to a considerable extent prevent leakage from the opening. I have found that patients with this form of colostomy quickly obtain most excellent control, and are able, with little or no trouble, to keep themselves clean.

Transverse Colostomy.—Colostomy of the transverse colon is not a new operation, for it was described in Allingham's "Diseases of the Rectum," published in 1901, and I know that Herbert Allingham thought well of the operation and not infrequently performed it.

It used to be considered that there was a great advantage in opening the colon as low down as possible, in order to allow the fæcal contents to become formed before evacuation, and that the best results as regards

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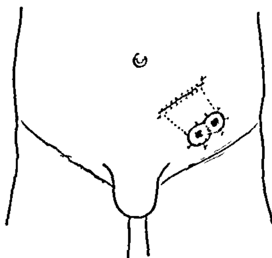


FIG. 213.—VALVE COLOSTOMY

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control over the evacuation of the stools were obtained by adhering to this principle. My belief, however, is that the factor which mainly determines the question of control is not so much the consistency of the stools as the presence of a reservoir for the fæcal contents just above the opening.

The chief aim of surgeons in regard to colostomy was to render the operation as safe as possible, and after this was attained to secure for the patient the maximum degree of control over the stools, and to prevent prolapse of the mucous membrane through the opening.

Transverse colostomy offers obvious advantages when the disease is in the sigmoid flexure, and should certainly always be preferred to cæcostomy, which is never a satisfactory operation. A contra-indication to transverse colostomy is a very short gastro-colic omentum and a small stomach. This is indicated on opening the abdomen by finding that the transverse colon will not easily come out of the wound, and, when pulled upon, the lower edge of the stomach comes into view. If a transverse colostomy is performed under these conditions, it may seriously interfere with the movements of the stomach. The incision I use enables either the transverse colon or the pelvic colon to be brought up, according to whichever seems to be the more suitable.

The Operation of Transverse Colostomy.—The best incision is a vertical one over the middle of the left rectus muscle, the upper limit being at, or just above, the umbilical level. The ideal length of the incision is 2 inches, but in practice this must depend upon circumstances, such as the amount of fat and the thickness of the muscle. It should, however, always be as short as possible. The anterior sheath of the rectus having been divided, the fibres of this muscle are separated by blunt dissection and the abdomen opened. The great omentum is then found and drawn out of the incision until the transverse colon is met with. The transverse colon must be investigated to see what length is available. If it is found that there is plenty of bowel, and that it can be brought up to the surface without undue traction on the stomach, a part of the transverse colon is selected as far up towards the splenic flexure as compatible with a reasonable freedom from tension. The fingers of the left hand are then passed under the great omentum, and the selected portion of transverse colon is pushed up with the fingers through the omentum overlying it. With a pair of blunt dissecting forceps held in the right hand a hole is then scratched in the great omentum till the colon itself is exposed, care being taken to avoid any obvious bloodvessels. When a sufficiently large hole has been made, the colon is pushed through it until a glass rod can be passed beneath the bowel, and a piece of rubber tubing of suitable size is passed over each end of the glass rod so as to retain it in position. The whole of the omentum is returned into the abdominal cavity, leaving the selected knuckle of colon completely surrounded by omentum, which occupies its normal

osition under the abdominal wall. The ends of the skin incision are now losed by stitches in the usual way. The glass rod, instead of lying across he wound as in sigmoid colostomy, will lie up and down it. An obvious uggestion is to make the skin incision transversely, so that the glass rod loes not lie on the wound. The objection to this is that a transverse ncision cannot be extended if an abnormality is discovered, and no harm esults from the presence of a glass rod over the wound.

After transverse colostomy the bowel usually has to be opened much earlier than with sigmoid colostomy, for symptoms of obstruction tend to come on quickly, and it is generally advisable to open the bowel within thirty-six hours. This is of little consequence, for the omental shield completely protects the abdominal cavity from any fear of infection, even if the wound should become septic, which is very seldom the case.

Temporary Colostomy. In this case the transverse operation, in my opinion, offers some slight advantages. It lends itself more readily to subsequent resection, owing to its more central situation and the greater length of the colon usually available. When there is a long, freely mobile pelvic colon, sigmoid colostomy should be preferred, but the part of the sigmoid chosen for a temporary opening should be the middle of the flexure. It is, however, undesirable to make it a rule to perform transverse colostomy; preference should be given to that form of colostomy which appears to offer most advantages in the particular case. My belief is that, all things considered, transverse colostomy generally gives the best results when a temporary colostomy has to be done.

Special Cases.—Serious difficulty may arise in the performance of colostomy in certain cases. I have on two or three occasions found that the sigmoid flexure was not in its usual position on the left side of the abdomen, but was situated in the right iliac fossa. If this abnormal position is due to transposition of the viscera, the wound should be closed and another one made on the opposite side. It often happens that when the colon is found it cannot be brought up into the wound, or this can only be achieved by considerable tension. Under such circumstances the wound should be well opened up with retractors or enlarged, and the assistant should draw the colon towards the midline so as to tension the outer side of the mesocolon. Any adhesions should then be carefully divided down near the base of the mesocolon, or, if this does not prove sufficient to mobilize the bowel, the outer layer of the mesocolon should be divided parallel with the bowel. As a rule, it will then be found that the colon can with ease be brought out of the skin incision without tension. If it proves impossible to get the bowel satisfactorily mobilized, a transverse colostomy should be performed.

Perhaps the greatest difficulty in performing colostomy occurs in the case of very stout persons. There may be 4 or 6 inches of fat between the

skin and the aponeurosis, and in addition the bowel and mesocolon may be so loaded with fat as to be almost immobile. The best plan under such circumstances, and one which I have often adopted, is to excise a circular area of fat from beneath the skin. The fat should be cut away for 3 inches or more all round the skin incision, so that the skin can come down in contact with the aponeurosis.

After the fat has been excised there will be found no difficulty in getting the colon to come outside the displaced skin without tension. The large and subcutaneous wound area should be drained by a small tube put in through a separate incision, and retained for two or three days. The wound should be carefully dressed to insure that there is firm pressure which will keep the skin pressed down against the aponeurosis, and the colon should not be opened for three or four days if possible. I have often done the operation in this way, and have never had any trouble with the wound. This method of bringing the skin down to the aponeurosis by excising an area of fat is by far the best way of performing a colostomy in a very stout subject.

Control over the Opening after Colostomy.—Very pessimistic opinions are generally expressed as regards the comfort of patients upon whom colostomy has been performed. With the object of ascertaining whether such a view is justified I investigated the after-histories of several of the patients upon whom I had performed colostomy.

Where the patient is willing and able to take a little trouble, very good control over the opening is usually obtained; so that I found many patients able to live an ordinary life, mixing with other people and attending to their business without difficulty and without others knowing of their disability.

Some patients had quite a surprising amount of control. One was a man of thirty-three, with a colostomy which had been made over a year previously. After the first four months he was always able to tell when the bowels were about to act, and the opening did not cause him the slightest trouble, except on one occasion after he had eaten something which disagreed with him. He attended to his business and played football for his local team.

Another patient was a gentleman who lived in the country and hunted several times a week; the colostomy had been done some years previously.

One patient, a stevedore at the London Docks, who had a permanent colostomy, was sixty-two years of age, and returned to his employment after the operation and worked his eight hours a day. He assured me that the colostomy opening did not interfere with his work, and he was quite able to keep himself clean.

Out of seventeen hospital patients in whom it was possible to investigate

the disability from a wage earning capacity, it was found that twelve had returned to work within a year of the operation, four had not returned, and one had been compelled to take a lighter job. All these patients had had their rectums excised for cancer, and had no disability apart from the colostomy opening. Of those patients who had returned to work there were included the following occupations: Engine driver on the railway, actor, washerwoman, workshop foreman, munition worker, physical drill instructor in the Army, and stevedore at the docks.

Late Complications of Colostomy.—The most common difficulty arises from narrowing of the opening due to contraction of the scar in the skin. In some patients there is a very marked tendency for the opening to get strictured from this cause. If this happens the bowels will not act smoothly, but tend to act in a series of small movements accompanied by painful spasm or discomfort. This difficulty can be to a large extent overcome if the patient occasionally passes a finger into the opening to stretch it. Should the opening become too tight, the condition can easily be rectified under a local anæsthetic by making a small incision in the skin margin, or the constricting band can be cut away.

Another trouble is that in course of time the spur retracts. This cannot occur if a skin bridge has been formed, but if no such bridge exists the opening of the colostomy should be dissected out and brought up to the surface, so as to again form a good spur, preferably with a bridge of skin between the ends.

My colleague, Gabriel, pointed out in 1928 that there is a risk of small gut passing between the outer side of the colostomy and the left side of the abdominal wall and becoming chronically, or acutely, strangulated. A loop of small bowel may pass downwards from above, or upwards from below. If a large loop gets caught in this situation it may result in obstruction, not only to the small bowel, but to the large, by pressing upon the colon above the colostomy. He collected five fatal cases of this condition. It may occur many years after the operation—in one case of mine, eleven years later. This is certainly a possible and serious cause of trouble after colostomy, and I have twice had to operate to relieve such a condition owing to symptoms of chronic obstruction. I do not, however, think it is at all a common complication, especially if the colostomy opening is made well towards the midline. When the colostomy is made near the flank, the space to the outer side of the colostomy will be too narrow, and this will enhance the danger of strangulation of small gut. Gabriel advises that when performing colostomy this space should be obliterated by catgut sutures. I think this is a good practice, and it is easily carried out in most cases.

Cæcostomy.

This operation is performed when it is not possible to perform colostomy, or when a colostomy opening will not be above the seat of obstruction. It is also sometimes done to deflect the fæcal current from the colon in cases of ulcerative colitis.

A permanent cæcostomy should never be performed if it can possibly be avoided, as, owing to the liquid contents of the colon and the fact that some of the digestive juices are often present in the contents, the opening causes acute distress. The skin around the opening becomes ulcerated and sore, and the patient is constantly troubled by the escape of liquid stools.

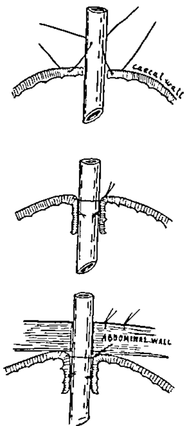


Fig. 214.—Tube Cæcostomy.

When it is desirable to make an opening in the cæcum to relieve obstruction, a temporary opening should be made in such a way that it will close spontaneously, as described here, and if it is desirable to have a permanent opening so that the colon can be flushed out, as in ulcerative colitis and some other conditions, then an appendicostomy opening should be made which will allow irrigation of the colon to be carried out, but will not involve any leakage of fæcal contents. It should never be necessary to perform a permanent cæcostomy.

Temporary Cæcostomy.—The best method of performing this operation is as follows: A small incision is made over the cæcum, and a knuckle of the cæcal wall drawn out and protected with gauze swabs. A hole is made in the cæcal wall with a knife, and a rubber drainage-tube about $\frac{1}{2}$ inch in diameter is pushed into the cæcum for about 2 inches. The tube is then stitched to the cæcal wall with catgut, each stitch going through the wall of the tube and picking up the cæcal wall $\frac{1}{2}$ inch away from the tube. When these are tied a cuff of cæcal wall will have been turned in. A purse-string suture is now inserted well away from the tube, and tied so as to turn in more of the cæcal wall (see Fig. 214). The ends of the suture after being tied are brought through the aponeurosis and peritoneum, and one or two other sutures placed so as to fix the cæcum at the point at which the tube enters to the deep surface of the abdominal wall. The abdomen is then sewn up around the tube. It is to be noted that no part of the

cæcum is fixed in the abdominal wall. The cæcal wall is merely fixed to the inner surface of the abdominal wall. A wide collapsible rubber tube is tied on to the end of the rubber drainage tube projecting from the dressings and carried over into a pail under the bed. The tube remains quite water and gas tight for as much as a week, and as the contents of the cæcum are liquid they drain away quite readily through a tube of this size; no leakage takes place in the wound, and the patient can be kept dry and comfortable.

The presence of a cæcostomy renders any such operation as resection of part of the colon much easier and safer, and the absence of toxæmia and distension much reduces the risks.

When the tube in the cæcum gets loose, which is usually in about eight or nine days, it may be removed, and, as a rule, there will be no leakage, assuming that the original obstruction has been removed.

I have never known one of these openings made in this way fail to close spontaneously in a week or two, and most of them have not leaked after the tube has come away.

Appendicostomy.

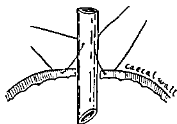
The operation is one that can quite easily be performed under local or regional anæsthesia. If the patient is seriously ill, it can be performed on his bed without disturbing him after a preliminary injection of morphia. If properly managed, the surgeon should be able to do the operation without causing any general disturbance of the patient at all, and the benefits which will immediately result from the irrigation of the colon will always more than compensate for the very slight disturbance that may have been caused. I have frequently performed this operation on patients who seem to be almost *in extremis*, and have never seen the slightest ill result from the operation *per se*.

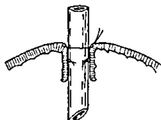
The operation is performed as follows: An oblique incision is made over McBurney's point in the same way as in the ordinary operation for appendicectomy. The incision need only be a short one, and 1½ inches is often sufficient. The peritoneal cavity is opened and the appendix found. The meso-appendix is then divided close to the appendix for from ½ to 1 inch, depending upon the length of the appendix; but in any case care should be taken not to sever the artery of the appendix. If it is cut, there is risk of the appendix sloughing through lack of adequate blood-supply. The artery should be looked for, and the meso-appendix only divided up to it, and no farther. The appendix is then brought out of the wound and pulled up until the cæcal wall comes well up against the parietal peritoneum. One or two catgut sutures may be inserted, so as to anchor the cæcal wall to the fascia and parietal peritoneum. Two or three stitches will then suffice to close the remainder of the wound. Lastly, a single

Cæcostomy.

This operation is performed when it is not possible to perform colostomy, or when a colostomy opening will not be above the seat of obstruction. It is also sometimes done to deflect the fæcal current from the colon in cases of ulcerative colitis.

A permanent cæcostomy should never be performed if it can possibly be avoided, as, owing to the liquid contents of the colon and the fact that some of the digestive juices are often present in the contents, the opening causes acute distress. The skin around the opening becomes ulcerated and sore, and the patient is constantly troubled by the escape of liquid stools.





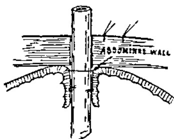


Fig 214 —Tube Cæcostomy.

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stitch should be passed through the wall of the appendix, so that it can be anchored to the skin and prevented from retracting. The dressings are then applied and the operation is finished. In applying the dressings, a roll of gauze should be placed on each side of the appendix to prevent the blood-supply being damaged by the pressure of the bandage.

If there is any doubt about the patency of the appendix, it should be opened at once, but if it is large and healthy it may be left, and opened later.

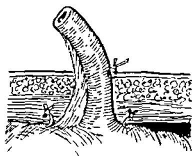


FIG. 215.—DIAGRAM TO SHOW THE METHOD OF FIXING THE CÆCUM AND APPENDIX TO THE ABDOMINAL WALL.

In performing the operation, and especially in closing the wound, the importance of preserving the blood-supply of the appendix should be borne in mind.

About a week later the dressings should be removed, and the appendix cut off about ¼ to ½ inch from the skin. It is better not to cut it flush with the skin. An appendicostomy catheter (No. 7 or No. 10) can then be passed into the cæcum through the stump of the appendix, and irrigation commenced. Later, any mucous membrane that projects above the skin level can be cut away so as to leave a neat opening.

The above seems to be the best procedure in view of leaving as good an opening as possible.

If the appendix is cut off at or soon after the operation, a certain amount of superficial suppuration in the wound will probably occur, and this often leads to some stricture at the orifice. The catheter should only be inserted in the canal for irrigation, not left in.

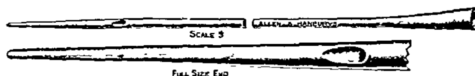


FIG 216.—APPENDICOSTOMY CATHETER.

The operation can be performed in a very short time, and with the minimum of exposure of the abdominal cavity. It is practically free from any serious risk, and can be performed on patients whose general condition is bad and would contra-indicate any more serious operation.

It not infrequently happens that at the operation the appendix is found to be diseased, deformed, or rudimentary; in such cases considerable modification of the technique will be necessary to deal with it, or it may not be possible to utilize the appendix at all. Under such circumstances

it should be removed, and some form of valvular cæcostomy, such as is presently described, performed.

It may be well to mention here that care should be taken as to the fluid used for irrigation. Considerable absorption occurs in the colon, and it is dangerous to put any fluid or dose of a drug into the colon that cannot safely be put into the stomach. This has not sometimes been sufficiently realized, and I have seen two cases of boracic acid poisoning, with a rash and vomiting, result from the use of boracic acid lotion for irrigation, and one case of carbolic acid poisoning from the use of weak lysol solution.

Experience shows that while the operation is practically devoid of any risk as regards life, there are several minor complications which may result and cause trouble, though, as I shall be able to show, these may be avoided by care in performing the operation.

Among the minor complications which may follow the operation must be mentioned sloughing of the appendix. This may result from care not having been taken to preserve the blood supply of the appendix at the time of operation, or by the leaving in of a catheter. The appendix has a tight elastic coat, and the mucous membrane may easily be made to slough by leaving a catheter inside it for any length of time. Should the appendix show signs of sloughing, a catheter must be passed in and retained, so as to preserve an opening. The opening that will result will have to be kept open by means of a plug, which must be worn permanently, and will not be so satisfactory as where the appendix has been preserved.

In some cases in which the appendix was cut off at the operation the stump retracted inside the wound, resulting in suppuration and subsequent difficulty in inserting the catheter.

In quite a number of cases I have found the appendix to be rudimentary, or even absent. In one case there was no cæcum or ascending colon, and the small intestine went straight into the transverse colon.

If there is any doubt about the patency of the appendix, it is best to make sure whether a catheter can be passed into the cæcum. When the appendix is found to be rudimentary, the best plan is to cut it off close to the cæcum, so as to leave a small opening into this organ (Fig. 217).

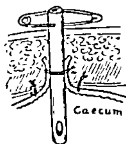
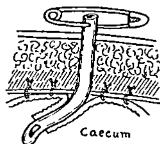


Fig. 217.

Should the appendix be completely absent, a small puncture should be made with a narrow-bladed knife into the cæcum. Through this small opening a No. 8 catheter is passed, and a purse-string suture is passed round the wall of the cæcum with catgut and drawn just tight enough to get a hold upon the catheter. Two more series of purse-string sutures,

at intervals of ¼ inch, are now similarly passed into the cæcal wall, and then passed through a sort of funnel of the cæcal wall into the cæcal lumen, or alternatively about an inch of the catheter is buried in the cæcal wall. The other end of the catheter is then brought out through the abdominal wall, and the wound closed (Fig. 218).

This makes a perfectly satisfactory opening, but as it is not lined with mucous membrane it will not remain patent unless something is kept in it. For this purpose I make use of a solid rubber plug the size of a No. 8 catheter, and about 7 inches long, which has a flat piece of rubber attached to its base which rests on the outside of the skin. This is removed when it is desired to pass the catheter.



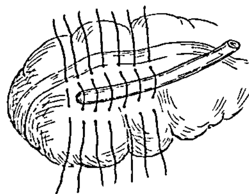


FIG. 218.—DIAGRAM TO SHOW METHOD OF MAKING A VALVULAR CÆCOSTOMY IN CASES WHERE THE APPENDIX CANNOT BE UTILIZED

When cutting off the appendix it is just as well to pass a catheter into the cæcum first and to divide the appendix on the catheter, otherwise it is possible that the mucous membrane may be turned inside out into the cæcum in passing the catheter after the appendix has been cut off, and may give rise to very considerable trouble in re-establishing the opening.

The results of appendicostomy as regards the operation itself are most satisfactory. After the wound has healed the opening is barely noticeable, appearing merely as a small pink spot on the abdominal wall. No leakage at all occurs through the opening when the catheter is withdrawn, or at least has not in any of the cases I have seen. Neither flatus nor fæces escape, and the presence of the opening causes the patient no inconvenience whatever. Most patients find it quite unnecessary to wear anything over it. I have several patients who have had one of these openings for over ten years. None of them have had any serious inconvenience from the opening, nor have they wished to have it closed. One patient succeeded in tying a knot in the catheter in the middle of the passage, but such an event must be very rare. In this particular case the knot had to be cut out.

Should it be necessary to close the opening, all that is required is a touch with the cautery or the application of a little nitric acid to the mucous lining of the opening, the wound readily healing in a few days.

It is better to keep it open till all possibility of its being required is gone, and as it causes no inconvenience this can readily be done.

Irrigation through the opening can be carried out easily by the patient, and he is not prevented from living his usual life or from going into the society of others in any way.

All that is necessary to irrigate the bowel is to pass a catheter into the opening and attach a Higginson's syringe to the other end. The fluid is then pumped into the cæcum in a few minutes, and allowed to run out at the anus. If oil is used, it is best put in with a glass syringe, as it flows too slowly through a funnel.

CHAPTER XXXIII

RESECTION OF THE COLON

As has already been pointed out, growths of the colon tend to remain localized to the bowel wall for a long time, and do not readily give rise to secondary gland involvement in the root of the mesentery or posterior peritoneal chain of glands. They grow slowly, and but seldom, and only in their later stages, give rise to metastatic deposits in other parts of the body. They do not readily become adherent to important organs, though an exception to this statement must be made in the case of growths of the transverse colon, which frequently involve the stomach. Large portions of the colon can be removed without causing the patient any serious subsequent inconvenience, or preventing him from enjoying life.

Twenty years ago chronic obstructive lesions of the colon were rarely, if ever, diagnosed, except as the result of an operation for acute obstruction or at post-mortem examination. At the present day the majority—I would almost like to say the great majority—of such lesions are diagnosed and treated before the onset of acute symptoms. Statistics on such a subject are difficult to obtain, but a paper published by Burgess of Manchester contains figures which illustrate this point. Out of 485 cases of cancer of the colon admitted between the years 1913 and 1922 to the Manchester Infirmary, 173 had acute obstruction—that is, 64·4 per cent. were diagnosed before acute obstruction had occurred. I know from my own experience that each year I see more cases where the diagnosis is made or suspected in time to prevent the onset of acute symptoms.

The results of operations for obstructive lesions of the colon twenty years ago were very bad. The mortality was high and the recoveries were for the most part accompanied by a permanent fæcal fistula of some kind. As the result mainly of improved diagnosis all this has been changed, and there are now few serious conditions which show better results from skilled surgery.

The fact that the surgeon is now able to operate upon lesions of the colon before the onset of obstruction has entirely altered the type of operation performed for this condition, and with proper precautions and careful technique it is now possible to resect that portion of the colon containing the lesion and to join the bowel up by axial union in one operation with very little risk—a procedure which was almost unheard of

twenty years ago, when Paul's two-stage method, Senn's plates, Robson bobbin, or Murphy's button were in use.

Many cases of cancer of the large bowel present themselves to the surgeon with symptoms of obstruction, either acute or chronic. When there is acute obstruction, the obvious indications are to relieve the obstruction, which immediately threatens a fatal issue, rather than to excise the growth, which may be dealt with afterwards, and at any rate can only be directly fatal at some later date. The surgeon should not be tempted into doing a complete operation at the time, for, though it may be ideal in theory, it is in practice too often attended by fatal consequences.

Patients with acute obstruction of the colon are generally in a profound toxæmic condition owing to the accumulation of poisonous substances in the large bowel, and are not in a state to stand any but the simplest and briefest of operations. The case should therefore be treated for obstruction only (see p. 520), and the question of removal of the growth postponed till all obstructive symptoms have subsided.

It is too often supposed that because, on opening the abdomen, the growth is found to be large or to be accompanied by a number of enlarged glands, it is therefore useless to remove it. In discussing the pathology it was pointed out that cancer of the colon tends to remain localized for long periods, and that the enlarged glands are frequently not cancerous; they do not, therefore, necessarily mean that the tumour has passed beyond the stage of successful removal, or that if the glands cannot all be removed, rapid recurrence will necessarily follow. Even adhesions are often not cancerous, and if the tumour can be removed and the continuity of the bowel ultimately restored without very serious risk, the operation should most certainly be proceeded with.

Adhesions of the growth to other viscera should also not necessarily be considered as contra-indicating excision, unless the adhesions are to some part which cannot be removed. If they are to the stomach, a portion of the latter viscus can be excised.

Preparation of the patient is of almost as much importance as the skill of the operator, and the best results are undoubtedly obtained by surgeons who pay most attention to this part of the treatment. It is not sufficient for the preparation to be left to the nurse, with a few brief directions; the surgeon should himself see that the preparatory treatment is carefully and efficiently carried out. A week, or even ten days, is not too much to devote to getting the patient ready for operation if an anastomosis is to be performed.

The bowel should first of all be well cleared by means of a purge, and for this purpose nothing is better than a dose of castor oil (from ½ to 1 ounce). This may with advantage be given several days or a week before the operation. After this the bowels should be kept acting daily

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to get it into a normal state, a preliminary temporary cæcostomy should be performed before attempting to remove the tumour.

Resection of the Colon.—The incision, of course, depends on the situation of the lesion, but when this is known approximately I always prefer a diagonal incision, which gives free access to the colon. It is also the most convenient for local anæsthesia, as it does not involve more than two nerves in the main incision, and these can be readily blocked. It is easily closed, and does not, in my experience, result in hernia, as the rectus muscle covers three-quarters of the wound when it is reclosed. It is essential that the recti muscles should be completely paralyzed either with regional, local, or spinal anæsthesia After the anterior sheath has been divided, the rectus muscle is freed from its sheath by light dissection and drawn across to the opposite side with retractors. The posterior sheath and peritoneum are then opened.

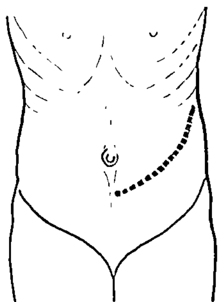


FIG 219 —THE AUTHOR'S INCISION FOR EXPOSURE OF THE COLON ON THE LEFT SIDE

The advantages of this incision are that if the patient is turned slightly on the right side and is supported with sandbags under the buttock and left shoulder-blade: (1) It gives splendid exposure to the whole of the left side of the colon; (2) the remainder of the intestines fall away and do not get in front of the colon during the operation; and (3) practically the whole of the incision lies through thick muscular structures which readily heal; further (4) no more than one nerve is likely to be divided; (5) the results, both as regards subsequent healing of the wound and as regards access to the colon, are admirable; (6) this incision enables the surgeon to remove the splenic angle with the greatest ease When there is doubt as to the locality of the lesion a midline incision is usually advisable.

I have used this incision for many years, and consider it vastly superior to any other. It affords the best and easiest access to the parts, and enables the surgeon to work with the minimum of disturbance of the abdominal cavity.

The extent of colon removed must vary with the circumstances of the case, and with the opinion of the surgeon operating, some surgeons preferring to remove considerable lengths of colon, others preferring merely

by some mild aperient, such as a small dose of magnesia or cascara and liberal doses of petroleum, either in the liquid or jelly form. The patient should not be restricted as regaras nis diet, but be instructed to eat only plain cooked food, and to avoid vegetables, fruit, or other substances which leave an indigestible residue. The teeth should be examined, and, if carious or otherwise unhealthy, the patient should go to a dentist and have them put right or extracted. An antiseptic mouth-wash should in any case be ordered twice daily to insure that the mouth is clean.

There are several ways in which we can advantageously modify the number and variety of the bacteria in the colon. We can give intestinal antiseptics by the mouth, such as liquor hydrarg. perchlor. ʒi., salol gr. x., or beta-naphthol gr. x., three times daily. Kerol and dimol are also useful drugs. Another and perhaps more efficient method of purifying the colon is by the use of the lactic acid ferment. This acts by introducing into the intestine a harmless micro-organism which will destroy and take the place of those which are already present. The best preparation for the purpose is a fresh culture of the Bulgarian bacillus prepared in a scientific laboratory. Two tablets of the dried culture should be given three times a day in a little sweetened milk. If a fresh laboratory culture is unobtainable, a good brand of soured milk should be given, the dose being about 2 pints a day. In either case it should be given before meals, and at the end of a day or two the stools should be examined for the bacillus. As soon as the bacillus has appeared in the stools, the dose by the mouth may be cut down by a third. This treatment must be commenced some time before the operation, in order to give the bacillus time to become acclimatized to the intestine. Occasionally some degree of digestive disturbance follows the use of the lactic acid bacillus, and in that case the operation should not be performed until it has passed off.

The patient should not be purged the day before operation, as this merely tends to lower his vitality and cause discomfort, while it is quite unnecessary if the bowels have been kept acting smoothly. Nor should the patient be starved on the night before the operation. It is a good plan to administer a dose of opium on the night before the operation with the object of arresting peristalsis. The opium also has the advantage of helping the patient to sleep the night before the operation, which he will often be unable to do without aid.

It is particularly desirable that the contents of the colon should be liquid both at the time of the operation and during the healing process afterwards. This can easily be done by administering by mouth a sufficient quantity of liquid petroleum daily both before and after operation.

If there is any doubt about the condition of the colon above the tumour, and the surgeon is not satisfied that by medical means he has been able

in the sigmoid region. Before commencing to sew the ends of the colon together it is often a good plan to momentarily release the clamps and see that free bleeding takes place from both cut ends of the bowel. If resection has been performed for malignant disease, a wedge-shaped portion of the mesocolon should always be removed in one piece with the resected bowel. And it is advisable to remove as far as possible all the lymphatic area immediately draining the growth.

At one time most surgeons preferred to join the colon by lateral anastomosis rather than by end-to-end or axial union, which was always used for the small intestine.

The reason that axial anastomosis of the colon has not been popular is that it was found that the mortality from this operation upon the large gut was high. Whereas axial anastomosis in the small intestine was a very successful operation with a low mortality, it was found that axial anastomosis in the large intestine frequently failed, being followed either by fatal peritonitis or by the development of a fæcal fistula. It was supposed that the lack of success in anastomosis of the colon was due to the more solid nature of the contents as compared with those of the small gut, rendering the line of suture more likely to give way. It was, however, found that the lateral anastomosis was not attended by the same proportion of failures as axial union, and therefore this method has become more popular. The real reason, however, why axial union of the large intestine so frequently failed has nothing to do with the nature of the contents of the colon, but is entirely due to the blood-supply of its walls. The arteries supplying the colon pass round the bowel in a circular direction from the mesenteric border, and are parallel to each other (see Fig. 220). There is very little anastomosis between the different vessels in the walls of the colon, although there is a free anastomosis along the free edge of the mesentery. It is obvious, therefore, that if in performing a resection the bowel is cut across transversely and sewn together in this position, there will be considerable risk of the stitches joining the edges of the bowel on the mesenteric side, constricting the vessels and so damaging the blood-supply of the bowel edges on the side opposite to the mesentery. As a matter of fact, when leakage occurs after axial union of the colon it will generally be found that the leakage is on the side opposite to the mesentery. The leakage is due to the sloughing of the edges of the bowel where they are stitched together, and not to inadequate or faulty suturing. In performing lateral anastomosis there is no danger of damaging the blood-supply to the sutured edges, as the arteries themselves cannot be caught up in a suture. All that is necessary, however, to secure a good result in axial anastomosis is to see that the bowel is cut across at an angle of 45 degrees from the mesentery outward (see Fig. 221)—that is to say, that a larger amount of bowel is removed on the free than on the attached side. In

to remove that portion which is necessary; but, as a general rule, it may be stated that in the case of a tumour in the cæcum, or at the hepatic or splenic angles, it is better to resect the entire angle rather than to attempt local resection.

It is often safest to plan the operation in several stages, but this must depend upon the particular circumstances and upon the judgment of the surgeon.

Whenever possible, the portion which it is proposed to resect should be drawn out of the abdomen, and the abdominal wound and peritoneum carefully protected by gauze packing and towels. The loop of the bowel is then as far as possible emptied by milking out the contents, and a rubber protected intestinal clamp is placed on the bowel well above and below the points at which it is proposed to divide the gut. The division should be always made through healthy bowel wall and well clear of the lesion. It is useless to attempt to anastomose unhealthy bowel. In the case of cancer the bowel should be divided at least 2 clear inches from the edges of the growth, and a much wider resection than this is often advisable. It is most important to make certain of preserving a good blood-supply to the edges of the bowel that are to be joined, and the greatest care must be taken to see that the stitches used in joining both the bowel ends and the mesocolon do not cut off the blood-supply to the cut edges of the colon. It is particularly the blood-supply to the distal or lower portion of the colon which is liable to be damaged, and this must be kept in mind. If there is any doubt as to the integrity of the blood-supply, a further length of bowel should be resected until an adequate vascular supply to both ends of bowel is insured. This is one of the most important factors in anastomosis of the colon, and failure to obtain a good vascular supply will inevitably result in sloughing and disaster. Nearly all the early failures in resecting the colon were attributable to damaging the blood-supply, and not, as was supposed, to faulty stitching. The greatest danger of damage to the blood-supply exists when the lower part of the sigmoid flexure has to be resected. The surgeon should always carefully trace out the bloodvessels to make sure that he is leaving a good collateral circulation to the ends of the colon, as the marginal artery is necessarily divided in performing any kind of resection. This is especially advisable, as the arteries in the mesocolon are often very abnormal, more particularly

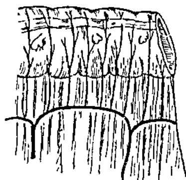


FIG. 220.—DIAGRAM TO SHOW THE WAY IN WHICH THE ARTERIES PASS FROM THE ARTERIAL ARCADES TO THE COLON WALL.

in the sigmoid region. Before commencing to sew the ends of the colon together it is often a good plan to momentarily release the clamps and see that free bleeding takes place from both cut ends of the bowel. If resection has been performed for malignant disease, a wedge-shaped portion of the mesocolon should always be removed in one piece with the resected bowel. And it is advisable to remove as far as possible all the lymphatic area immediately draining the growth.

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this way a good blood-supply is insured to the whole of the sutured edges, while it has the additional advantage of making the diameter of the lumen of the bowel rather larger than normal at the point of union, which compensates for any narrowing due to turning in of the edges. If this method of joining the colon axially is adopted, leakage from the formation of a fæcal fistula is no more likely to occur than with lateral anastomosis, or axial anastomosis of the small intestine. I have used this method for years, and have had very few cases in which a perfect result was not obtained.

I shall first describe end-to-end or axial union of the colon by the method which I have personally found to be the best in most cases, and then other methods of axial union.

Axial or End-to-End Anastomosis.—The part of the colon which it is proposed to resect is first drawn up into the wound and the mesentery

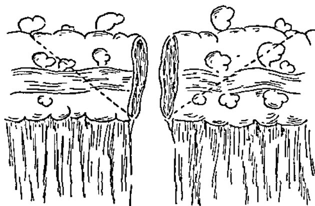


FIG. 221.
The dotted lines show how the bowel ends should be divided before performing end-to-end union.

divided and any vessels secured. Rubber-covered clamps are next applied well above and below the area which it is proposed to resect. The bowel is then cut through at an angle of 45° to its transverse diameter, both above and below, and the resected portion is removed, together with its attached mesentery (Fig. 221). If the clamps are controlling the blood-vessels in the mesentery, they should be momentarily released, particularly the lower clamp, to make certain that there is a good blood-supply to the bowel ends, as it is very easy to damage the blood-supply to the lower ends of the colon when tying off the mesentery, more especially in fat persons. The two ends of the bowel are then brought in contact and caught together by two pairs of toothed forceps, or, if preferred, guide sutures, the forceps being applied on the lateral aspects of the bowel, so that the two mesenteric edges come straight together (Fig. 222). If there is excessive bulging of the mucous membrane some of this may be cut away.

A stitch of fine catgut with a short straight needle is now started from one pair of toothed forceps and carried across to the other side of the bowel. This stitch takes up all the coats, and is locked about every four

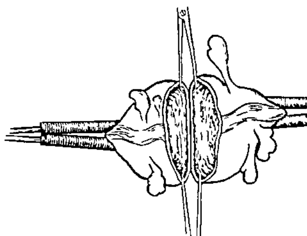


FIG. 222.—THE APPLICATION OF THE FORCEPS OR GUIDE SUTURES AT THE SIDES OF THE BOWEL HALF-WAY BETWEEN THE MESENTERIC ATTACHMENT AND THE FREE BORDER.

or five stitches. It should be drawn sufficiently tight to insure controlling any bleeding, and it is just as well to slack off the clamps occasionally to make sure that this has been done. When this stitch reaches the

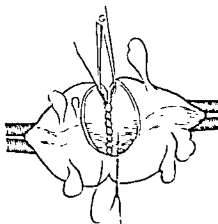


FIG. 223

When the suture reaches the opposite side of the bowel the toothed forceps are removed and the stitch is continued around until it reaches the point where it started. It is then tied off, great care being taken to keep all knots on the inner surface of the bowel.

opposite pair of forceps they are removed, and it is continued right round until it reaches the point where it started, where it is tied off (Fig. 223). The clamps are then released, the dirty towels and swabs removed, and

the gloves changed, the bowel itself being first of all gently washed. A fine catgut peritoneal suture is now started on the mesenteric attachment on the outer side and carried right round the bowel over the first suture and down the gap in the mesentery so as to close it. I prefer to use ordinary through-and-through stitches and to use catgut entirely. Fine catgut on Souttar needles is very good for this purpose (Fig. 224).

Lastly, I like to have an omental graft over the anastomosis. One great advantage of the graft is that it prevents the adhesion of other structures to the line of anastomosis and gives much greater security should there be any leakage in the neighbourhood of the stitches. I do not think it matters very much whether it is a live or a detached graft. Where the omentum is large and long a live graft is very satisfactory, but detached grafts appear to me to do equally well, and there is not the risk of fixing the omentum and so possibly of producing bands. Finton and Peet's experimental work shows that detached omental grafts remain alive when wrapped round the intestine. I generally suture the omentum lightly round the junction with catgut sutures, and then divide the omentum afterwards if it is considered necessary. This operation can be very quickly performed, and has given excellent results.

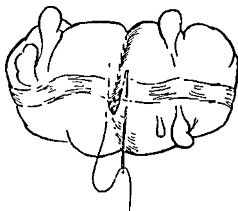


FIG. 224.—THE CONTINUATION OF THE FINE-THREAD PERITONEAL STITCH UNTIL IT MEETS THE MESENTERY ON THE OPPOSITE SIDE OF THE BOWEL, WHERE IT IS CONTINUED DOWN THE MESENTERY ITSELF SO AS TO CLOSE THE GAP.

For some years now I have made it a practice to drain the cæcum as a routine in all cases of anastomosis of the colon. I am sure that it renders the operation much safer, and has been one of the chief means of reducing the mortality of these operations. At one time I used the appendix for this purpose, but for the last few years have been using the tube cæcostomy, as described on p. 552.

This most effectually drains the cæcum. In fact, while the tube is in place, practically all the intestinal contents pass out through the tube, as the contents of the cæcum are quite liquid. The patient is kept perfectly clean and comfortable by this method, and no leakage occurs for from eight to ten days. After this the catgut stitches dissolve and the tube becomes loose. It may then be removed, and as a rule there will be no eakage, as the opening in the cæcum automatically closes.

The presence of a drain in the cæcum prevents any strain being put upon the line of anastomosis from distension, etc., and does away with the necessity of getting the bowels open via the anastomosis for eight to ten

days, which should be more than sufficient to enable sound healing to take place.

After-Treatment.—With a tube in the cæcum a mild aperient can be given at any time, as it will act through the cæcal tube. The rectum and sigmoid can be safely irrigated gently with saline the day after operation if it is thought advisable.

The patient should be fed on ordinary solid food from the first. A beefsteak is quite as liquid as a glass of milk by the time it reaches the ileocæcal valve.

As already mentioned, the tube in the cæcum will come out about the ninth day, and after this the bowels should be kept moving gently with liquid petroleum and salines.

Colectomy combined with Colostomy (Paul's Method).—While colectomy with axial union gives excellent results, and in skilled hands is a reasonably safe operation, it requires considerable practice to do well, and is certainly a dangerous operation unless very skilfully performed. The alternative method of removing a growth in the colon and restoring the continuity of the bowel which is here described was originally suggested by Paul of Liverpool, and goes by his name. It can be rapidly and easily performed, and is the best method of dealing with a growth in the colon for those not specially skilled in abdominal surgery, and in very stout subjects and when there is any serious difficulty. The chief objection to it is that it involves two or three operations, and the patient is laid up for many weeks. It is nevertheless an admirable operation, and will probably always retain its place in the surgery of the colon.

The colon is exposed, and the loop of colon containing the tumour is mobilized as freely as possible, it is drawn up out of the wound; if necessary, a wedge-shaped portion of the mesocolon, together with the glands, is removed, care being taken not to damage the blood-supply. The two portions of colon are now sewn together with a peritoneal stitch from as far down as possible up to the point where they emerge from the skin. This stitch should be so placed as to bring those parts of the colon opposite the mesentery in contact, and to prevent any part of the mesentery lying between them. The skin wound is now sewn up round the ends of the bowel, and temporary dressings applied. The loop containing the tumour is then cut off, leaving two stumps of colon, into each of which a glass Paul's tube of suitable size is tied with a silk ligature or piece of tape, or alternatively the lower opening can be left with a clamp on it. The glass tubes are attached to rubber tubing, which is carried over the sides of the bed into a bucket. The glass tubes separate and come away in about a week's time, leaving an ordinary colostomy. When this has settled down, and there is no longer any inflammatory reaction, the spur between the two portions of the colon must be destroyed.

I think it is advisable to wait for a week or ten days before commencing to destroy the spur, but some surgeons believe in applying the enterotome for this purpose on the third or fourth day. When stitching the two limbs of the colon together at the primary operation, a line of stitches should, if possible, be inserted on both the inner and outer aspects, care being taken especially to prevent any part of the mesocolon or mesenteric edge

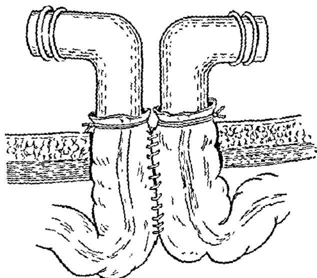


Fig. 225.—Paul's Method of Colectomy.

of the bowel from being left situated between the two limbs of colon, where it might subsequently be crushed by the enterotome. Severe pain when the enterotome is applied results from some portion of the bowel edge of the mesocolon having been caught between the blades.

The spur between the two portions of bowel is first destroyed, so as to make the upper and lower limbs of the colon communicate freely below

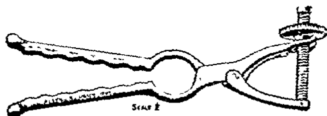


Fig. 226.—Enterotome for destroying the Spur.

the skin level. This is done by means of an enterotome. There are several varieties of this instrument, all more or less similar to the one illustrated (Fig. 226). Personally I prefer to use an instrument with spikes or projections on one blade which fit into holes in the opposing blade, so as to be quite certain that no slipping will take place.

The surgeon places his first and second fingers into the two openings of

the colon, and assures himself that there is nothing but the respective walls of the two portions of colon lying between his fingers. The two blades of the enterotome are then inserted along his fingers so that one blade lies in each portion of bowel, and the instrument is closed so as to grip the spur tightly over a distance of about 1½ to 2 inches. The instrument having been firmly fixed in position and the handle supported by dressings, it is left until it comes loose owing to the destruction of the spur by sloughing. The blades of the instrument are very apt to slip up the spur, and it may be necessary to reapply it several times.

It takes, as a rule, from two to five days to destroy the spur and join up the two portions of bowel. If the bowel is examined after the enterotome has become loose, it will be found that there is some swelling of the edges of the opening, but this disappears in a few days. The fæces will at once begin to pass in part by the normal channel, and steps can then be taken to close the skin opening This necessitates an anæsthetic. The edges of the mucous membrane should be dissected loose from the skin and muscles, turned in, and stitched together. The skin, and as much of the deep parts as possible, should then be brought together above, so as to close the skin opening.

It is useless to attempt to close the skin opening unless the spur has been completely destroyed. There should be a good free opening between the two portions of bowel below the abdominal wall. It is often stated that this method of joining the colon is quite free from danger, but this is not the case. I have known of at least three cases where there was a fatal result from peritonitis. The enterotome should not be pulled on, and nothing should be done to it beyond tightening it, if necessary until it comes away. Attempts to pull it off may result in troublesome hæmorrhage or leakage of the bowel.

Methods of performing Anastomosis without exposing the Interior of the Colon.—Several very ingenious methods of joining the colon end to end have been designed by means of which the colon is never opened, and the interior of the bowel is not seen or exposed at any stage of the operation. Some of these methods deserve description.

In the first method, which was described by Gudin and elaborated by Martel, the colon is crushed with a powerful crushing forceps at the points at which it is proposed to divide it. Four narrow-bladed, slightly tapered clamps are then placed on the crushed segments of colon (as shown in Fig. 227), and the colon cut through between the clamps. The resected portion of the colon having been removed, the two remaining clamps are brought together, and the ends of the colon are sewn together *over* the clamps, as shown in Fig 228. When the stitch, which has been started at the clamps, has passed all round the bowel and gets back to the clamps again, the latter are removed and the two ends of the stitch are tied to-

gether. The ends of the colon are now joined together, but there is no open lumen, as the crushed ends are still shut. By invaginating the bowel just above the suture line with the finger, the lumen is again re-established.

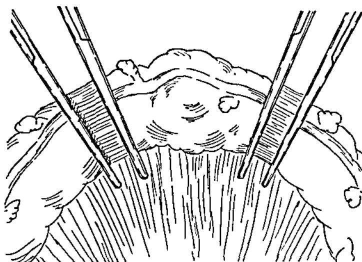


FIG. 227.—METHOD OF JOINING THE COLON WITHOUT EXPOSURE OF MUCOUS MEMBRANE. (CLAMPS APPLIED).

There are a great variety of clamps specially designed for this method of anastomosis. Rankin's is a most satisfactory type in some cases. Martel's is also very useful.

An ingenious modification of this method is suggested by Martel and illustrated in Fig. 229. After the colon has been crushed and divided

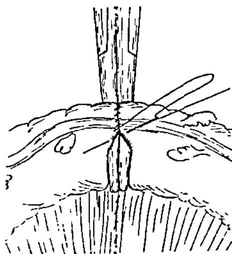


FIG. 228.—ENDS OF COLON BEING SEWN TOGETHER OVER THE CLAMPS.

the clamps are removed, and the two crushed ends of the bowel are placed together with one crushed end on top of the other. A stitch is then passed through both the crushed ends so as to fix them together and prevent them

getting out of place. The ends of this stitch are passed over the extremities of a steel bow and fixed as shown. This holds the crushed ends firmly in position and facilitates the stitching together of the uncrushed ends of bowel. The permanent stitch, which, of course, only takes up the peritoneal and elastic coats, goes all round the bowel and is tied off After this is completed the steel bow is removed and the first straight stitch is pulled out, the lumen of the bowel being re-established in the same manner as in the previous method.

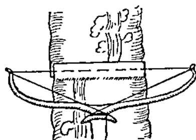


FIG. 229.—MARTEL'S METHOD: ENDS OF COLON HELD IN POSITION BY TEMPORARY STITCH.

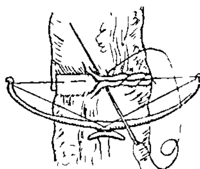


FIG 230 —ANASTOMOSING STITCH BEING INSERTED

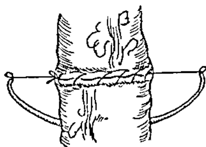


FIG. 231.—ANASTOMOSING STITCH COMPLETED (TEMPORARY STITCH IS NOW WITHDRAWN).

The criticism of these methods of joining the colon is that although they prevent any exposure of, or contact with, the mucous membrane, the juice which has to be squeezed out in crushing the bowel must certainly contain micro-organisms. Also the stitches do not control hæmorrhage from the cut ends of the bowel, and immunity from hæmorrhage is entirely dependent upon the crushing. Further, I do not like the idea of having crushed, and consequently dead, tissue in the immediate neighbourhood of my anastomosis. It may be that none of these objections are very important, but they appear to me to more than balance any advantage there may be from non-exposure of the mucous membrane during the anastomosis. The closed or so-called aseptic method has distinct advantages in

gether. The ends of the colon are now joined together, but there is no open lumen, as the crushed ends are still shut. By invaginating the bowel just above the suture line with the finger, the lumen is again re-established.

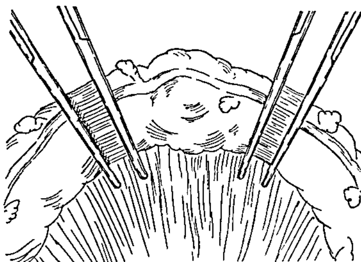


FIG. 227.—METHOD OF JOINING THE COLON WITHOUT EXPOSURE OF MUCOUS MEMBRANE. (CLAMPS APPLIED).

There are a great variety of clamps specially designed for this method of anastomosis. Rankin's is a most satisfactory type in some cases. Martel's is also very useful.

An ingenious modification of this method is suggested by Martel and illustrated in Fig. 229. After the colon has been crushed and divided

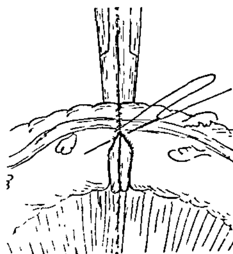


FIG. 228.—ENDS OF COLON BEING SEWN TOGETHER OVER THE CLAMPS.

the clamps are removed, and the two crushed ends of the bowel are placed together with one crushed end on top of the other. A stitch is then passed through both the crushed ends so as to fix them together and prevent them

getting out of place. The ends of the ... ties of a steel bow and fixed as shown ... in position and facilitates the stitching ... of bowel. The permanent stitch ... peritoneal and elastic coats, goes all r... this is completed the steel bow is rem... pulled out, the lumen of the bowel being ... as in the previous method.

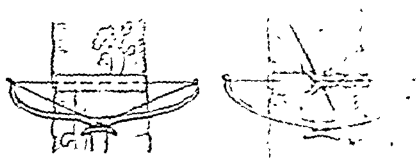


Fig. ...—Martel's Method ... of Colon held in Position by Temporary Stitch



gether. The ends of the colon are now joined together, but there is no open lumen, as the crushed ends are still shut. By invaginating the bowel just above the suture line with the finger, the lumen is again re-established.

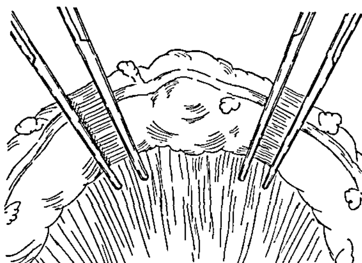


Fig. 227.—Method of joining the Colon without Exposure of Mucous Membrane. (Clamps Applied).

There are a great variety of clamps specially designed for this method of anastomosis. Rankin's is a most satisfactory type in some cases. Martel's is also very useful.

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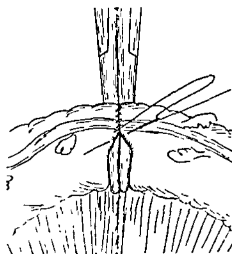


Fig. 228.—Ends of Colon being sewn together over the Clamps.

the clamps are removed, and the two crushed ends of the bowel are placed together with one crushed end on top of the other. A stitch is then passed through both the crushed ends so as to fix them together and prevent them

getting out of place. The ends of t[illegible] which are passed over the extremities of a steel bow and fixed as sh[illegible] This holds the crushed end firmly in position and facilitates the st[illegible] together of the uncrushed ends of bowel. The permanent stitch [illegible] of course, only takes up the peritoneal and elastic coats, goes [illegible] the bowel and is tied off. After this is completed the steel bow [illegible] and the first straight stitch is pulled out, the lumen of the bowe[illegible] established in the same manner as in the previous method.

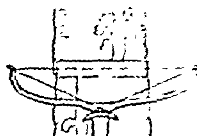


Fig. 270.—Makkas's Meth[illegible] of Colon [illegible] Temporary Stitch



[illegible]



certain cases, but great care must be taken to leave a good wide stoma at the point of anastomosis.

Lateral Anastomosis.—Clamps are applied to the colon and the bowel is divided between them. After removing the portion to be resected, the ends of the bowel are closed by one of the various methods which will be described later. The two closed ends are then brought together side by side, but so that the peristaltic direction is not reversed, and a peritoneal stitch is inserted fixing them together for about 2 inches. An incision is now made with a knife into each of the closed ends of bowel parallel with the first line of stitches, and about ⅛ inch from it. These cuts into the bowel should not be quite as long as the stitched portion of bowel. Another stitch is now started taking up all the coats of the bowel, and is continued right round until the two portions of bowel have been properly joined. When this stitch has been completed, the peritoneal stitch is continued

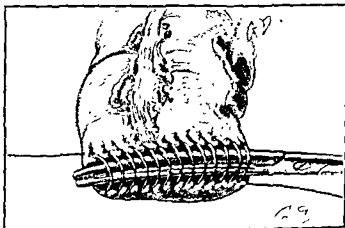


FIG. 232.—METHOD OF CLOSING THE END OF THE COLON BY SEWING OVER A CLAMP.

round till it comes back to the place where it started. The gap in the mesentery is closed as in end-to-end anastomosis.

It is important that the blind end left in the proximal portion of the colon should be as short as possible, or it may subsequently give rise to trouble. In order to secure this object the stoma in the bowel end should be carried as close to the closed end as possible. In one case an abscess formed, and in two others tubercular disease developed.

In order to perform lateral anastomosis a considerably greater length of free colon is required than in axial union.

Methods of closing the End of the Colon.—There are many conditions where this is necessary. It has to be done in performing lateral anastomosis, abdomino-perineal excision, and in many atypical resections of the colon. There are several good and simple methods. The one I prefer is a Mickulicz stitch after crushing the bowel end. For preference, the colon

is divided with a cautery between crushing forceps ... in backwards and forwards over the crushing clamp ... tapered to facilitate its removal, as in Fig. ... When ... completed, the surgeon takes one end of ...

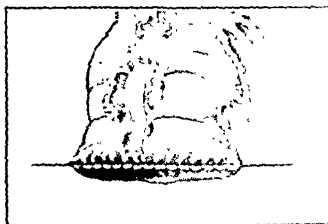


Fig. 233.—Closure completed by ... the ... of the ...

certain cases, but great care must be taken to leave a good wide stoma at the point of anastomosis.

Lateral Anastomosis.—Clamps are applied to the colon and the bowel is divided between them. After removing the portion to be resected, the ends of the bowel are closed by one of the various methods which will be described later. The two closed ends are then brought together side by side, but so that the peristaltic direction is not reversed, and a peritoneal stitch is inserted fixing them together for about 2 inches. An incision is now made with a knife into each of the closed ends of bowel parallel with the first line of stitches, and about $\frac{1}{8}$ inch from it. These cuts into the bowel should not be quite as long as the stitched portion of bowel. Another stitch is now started taking up all the coats of the bowel, and is continued right round until the two portions of bowel have been properly joined. When this stitch has been completed, the peritoneal stitch is continued

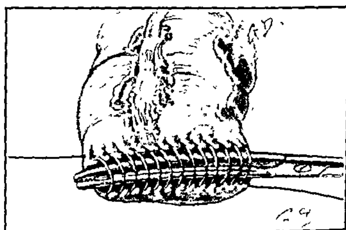


FIG 232.—METHOD OF CLOSING THE END OF THE COLON BY SEWING OVER A CLAMP.

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is divided with a cautery between crushing forceps. A stitch is then put in backwards and forwards over the crushing clamp, which should be *tapered to facilitate its removal, as in Fig. 232.* When the stitch has been completed, the surgeon takes one end of it in each hand, and his assistant

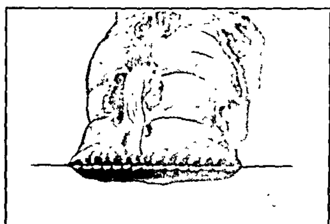


FIG. 233.—CLOSURE COMPLETED BY WITHDRAWING THE CLAMP AND PULLING ON THE ENDS OF THE STITCH

The ends are afterwards tied together

gently opens and withdraws the clamp. Traction on the ends of the stitch will then turn the bowel in and bring the peritoneal surfaces in contact. A mattress or purse-string suture can be inserted over this if thought desirable for greater safety. This method is simple and requires no handling of a septic surface.

A simple method (Abadie) is, after crushing the bowel and dividing it, to seize the extremities of the crushed end in two pointed forceps, and roll the forceps in opposite directions inwards, as shown in Fig. 234. A ligature is then placed round the crushed portion and tightened as the forceps are withdrawn.

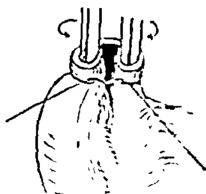


FIG. 234.—[illegible]

Another method is that of Klapp, shown in Fig. 235. The end of the colon is seized in a clamp and rolled up on itself, a few stitches being put in to prevent it coming undone again.

Another method is to crush the bowel with a tapered clamp, and then sew round and round the clamp from one end to the other [illegible] Fig. 236. The clamp is then removed, and the [illegible] the ends tied. With this method it is certainly [illegible]

certain cases, but great care must be taken to leave a good wide stoma at the point of anastomosis.

Lateral Anastomosis.—Clamps are applied to the colon and the bowel is divided between them. After removing the portion to be resected, the ends of the bowel are closed by one of the various methods which will be described later. The two closed ends are then brought together side by side, but so that the peristaltic direction is not reversed, and a peritoneal stitch is inserted fixing them together for about 2 inches. An incision is now made with a knife into each of the closed ends of bowel parallel with the first line of stitches, and about ⅛ inch from it. These cuts into the bowel should not be quite as long as the stitched portion of bowel. Another stitch is now started taking up all the coats of the bowel, and is continued right round until the two portions of bowel have been properly joined. When this stitch has been completed, the peritoneal stitch is continued

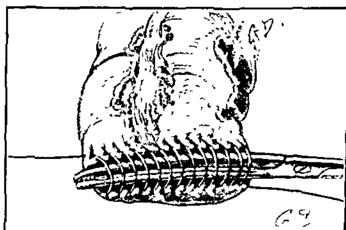


FIG 232 —METHOD OF CLOSING THE END OF THE COLON BY SEWING OVER A CLAMP.

round till it comes back to the place where it started. The gap in the mesentery is closed as in end-to-end anastomosis.

It is important that the blind end left in the proximal portion of the colon should be as short as possible, or it may subsequently give rise to trouble. In order to secure this object the stoma in the bowel end should be carried as close to the closed end as possible. In one case an abscess formed, and in two others tubercular disease developed.

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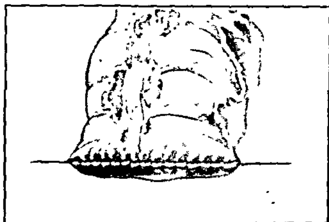
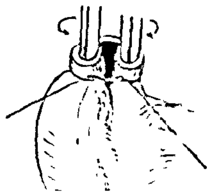


Fig. 233.—Closure completed by withdrawing the Clamp and pulling on the Ends of the Stitch

The ends are afterwards tied together

gently opens and withdraws the clamp. Traction on the ends of the stitch will then turn the bowel in and bring the peritoneal surfaces in contact. A mattress or purse-string suture can be inserted over this if thought desirable for greater safety. This method is simple and requires no handling of a septic surface.

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Another method is that of Klapp shown in Fig. 235. The end of the

porting suture, as the crushed portion, which must slough, is left on the outside of the bowel, and not inside the lumen, as with the first method described.

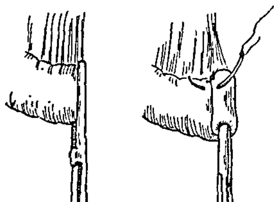


FIG. 235.—METHOD OF CLOSING THE END OF THE COLON (KLAPP).

In the case of resection of the cæcal end of the colon, if the ileum and colon are to be united end to end, it is necessary first of all to make the

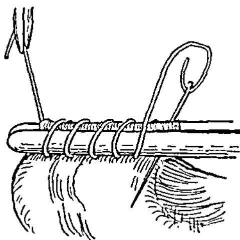


FIG. 236.—METHOD OF CLOSING THE END OF THE COLON BY STITCHING ROUND THE CLAMP.





FIG. 237.

FIG. 238.



FIG. 239.

two ends of bowel the same size. There are several methods of doing this.

The ileum may be cut obliquely and the colon transversely (see Fig. 237).

The ileum may be joined to the colon and then the excess of colon sewn up (see Fig. 238).

A V-shaped piece of the colon may be cut out of the side opposite the mesenteric attachment, and the end of the wound sewn up to make the end of the colon the same size as the ileum.

Special Forms of Anastomosis.

Anastomosis between the Small and Large Intestines.—This is generally performed by implantation of the small intestine into the side of the colon after closing one end of the latter.

If performed after resection, the end of the colon is first stitched up, then an incision of suitable length is made into the side of the blind end of the colon, and about 1 or 2 inches from the end in the long axis of the bowel. A guide suture is then inserted, taking up the end of [illegible] and the middle of the side wall of the ileum, a similar suture being placed on the other side (see Fig. 240). These insure the ends of the bowel being stitched together correctly, and are useful in holding the bowel edges in position during suturing. The two edges are then sutured together, taking up all coats, and last of all a protecting peritoneal line of suture is put in over the first, and the mesentery is stitched together.

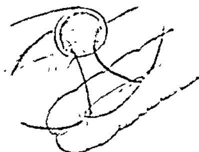


Fig. 240.—Diagram showing the Method of inserting Guide Sutures in performing Anastomosis by Implantation.

with preservation of the ileocæcal valve. A triangular section of the cæcal wall containing the valve is anastomosed to the side of the transverse colon. An alternative and easier method is to divide the cæcum ½ inch beyond the sphincter, and make an end-to-end anastomosis between the stump of the cæcum and the transverse colon. For details of the operation, which are rather complicated, the reader is referred to the original paper. There are obvious advantages in the preservation of the ileocæcal valve, but the comparatively limited field for such a procedure and the considerably increased risk involved will probably prevent its being adopted at all commonly.

Ileo-Sigmoidostomy.—This may be done either by lateral anastomosis or by implantation of the ileum into the sigmoid flexure. Lane, who has been one of the chief advocates of ileo-sigmoidostomy, advises division of the ileum about 6 inches from the ileocæcal valve, and implantation of the proximal end into the sigmoid flexure by suture. The distal end of the ileum is closed. When, as in the case of ileo-sigmoidostomy, the join is near the anus, it is an advantage to insert a long rectal tube through the *anus and pass it up the bowel till the end is several inches above the line* of union. This drains the portion of bowel immediately above the junction, and prevents any strain being put upon it during the healing process. It acts in a similar manner to the tube fixed into the cæcum already described.

Excision of Growths in the Cæcal Region.—These lend themselves readily to extensive resection, as the entire cæcal angle of the colon can be freed and removed, together with the growth. Any attempts to resect portions of the cæcum will probably end in failure, both as regards removal of the disease and also satisfactory restoration of the parts. The peritoneum attaching the cæcum and ascending colon to the posterior abdominal wall should be divided on the outer side, and the entire cæcal angle stripped up with the fingers aided by a gauze swab, together with the growth and tissues in the iliac fossa. Next, the vessels should be defined, care being taken to avoid the duodenum, ureter, and spermatic vessels. Those vessels that will require ligature are the ileocolic and cæcal arteries. If there are any glands along the line of the right ileocolic artery, it may be further necessary to ligature the right colic artery, which lies close to it, in order to make certain of clearing them away. The entire cæcal angle and tumour can now be easily brought out of the wound. Clamps are next applied to the ileum and colon, and the tumour and cæcum are cut away. If it has been necessary to ligature the right colic artery, *the greater part of the ascending colon must also be removed*, as its blood-supply has been damaged.

The next step is to deal with the bowel ends. It is most important to see that there is a good blood-supply to the stump of bowel left after

with preservation of the ileocæcal valve. A triangular section of the cæcal wall containing the valve is anastomosed to the side of the transverse colon. An alternative and easier method is to divide the cæcum ½ inch beyond the sphincter, and make an end-to-end anastomosis between the stump of the cæcum and the transverse colon. For details of the operation, which are rather complicated, the reader is referred to the original paper. There are obvious advantages in the preservation of the ileocæcal valve, but the comparatively limited field for such a procedure and the considerably increased risk involved will probably prevent its being adopted at all commonly.

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The next step is to deal with the bowel ends. It is most important to see that there is a good blood-supply to the stump of bowel left after

division. If this is not satisfactory more bowel should be resected until an efficient blood-supply is obtained.

The choice of a method must of course depend very largely upon the circumstances of the case. The operation may be performed all in one stage or in two. If in two stages, an ileo-colostomy should be done at the time the abdomen is explored, and ten days later the cæcal angle and growth removed, and the bowel ends [illegible] close to the anastomosis.

Should it be decided to [illegible] at once, there are two methods available. The [illegible] colon can be closed up, and the ileum implanted [illegible] the transverse colon; or the stumps may be joined end-to-end [illegible] their respective openings have been made to correspond [illegible] the recognized methods. There is still another method [illegible] ends and do a lateral anastomosis—but this has [illegible] recommend it, and several disadvantages.

I think the quickest and [illegible] procedure is to join the ends of the bowel end-to-end. In [illegible] at the cæcal angle it is not necessary to drain the bowel [illegible], but some surgeons prefer to do so by bringing the end [illegible] out on to the skin after implanting the ileum into the side of [illegible] colon. I have personally never drained the bowel in such [illegible] any necessity to do so. Fæcal fistulæ into the [illegible] difficult to close, and a better procedure is to do the [illegible] stages, beginning with an ileo-colostomy. Wakeley and [illegible] report fourteen cases of resection of the cæcum for cancer by the [illegible] stage method, with no death.

freely out of the abdominal wound and can be removed, and the transverse colon joined end to end to the sigmoid flexure.

The diagonal incision already described is very useful here, as it gives excellent exposure of the angle and allows the colon to be easily freed. It is very necessary to free the colon thoroughly to get the ends to come

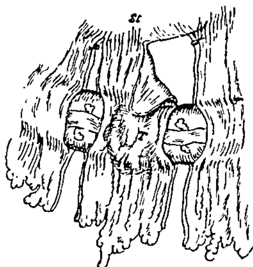


FIG. 241.

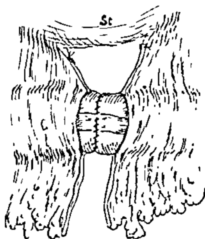


FIG. 242.

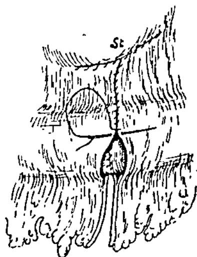


FIG. 243.

RESECTION OF THE TRANSVERSE COLON.

Fig 241 shows the portion of the colon containing the growth being separated. Fig. 242 shows the ends joined up again, and Fig. 243 shows omentum being stitched over the junction.

comfortably together. Care has to be taken in freeing the angle itself not to damage the lower part of the spleen, which is in very close contact, or the kidney and pancreas, which are close behind it. Some of the best results I have seen have been in cases of resection of the splenic angle (see Figs. 244 and 245).



FIG. 244.—RESECTION OF THE SPLEN[illegible] ... THE [illegible] ... METHOD OF [illegible]

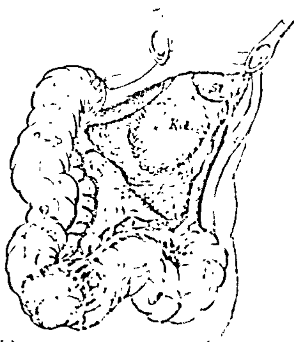


FIG. 245.—THE SPLENIC ... [illegible] ... COMPLETELY [illegible]

to the tube by a stout ligature. Although this is simpler, experience has shown that it is advisable for the tube to extend a considerable way above the intussusception, as swelling may occur at this point and block the end of the tube. In performing this operation I now always tie a tube into *the cæcum or perform a temporary colostomy.*

The condition produced is practically a short artificial intussusception, the two peritoneal coats being in apposition and the ends of the mucous coats close together, although not necessarily touching. Owing to the presence of the tube no leakage can occur, and the ends of the bowel have about a week in which to become united before there is any possibility of strain being thrown upon the line of union. While the tube is still in position the bowels can be freely opened without risk of leakage. It is, of course, as in all forms of anastomosis, vitally necessary to insure that

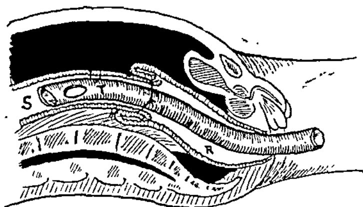


FIG. 247.—AUTHOR'S TUBE METHOD OF JOINING THE BOWEL FOR GROWTHS AT THE LOWER END OF THE SIGMOID.

there is still a good blood-supply to the lower segment of bowel, otherwise serious complications will ensue.

I have performed this operation a number of times, often with very successful results, but it has rather a high mortality owing to the danger of sloughing of the upper end of the rectum and consequent sepsis in the back of the pelvis. When successful, it has the advantage *that there is complete restoration of normal function.* I have two patients who have had this operation done who have survived ten years or more.

Total Colectomy.—This operation has been performed for severe cases of atony of the colon, but has not proved very satisfactory in such cases, and is now seldom if ever performed for that purpose. In cases of adenomatosis of the colon it is the only method by which the disease can be eradicated, and occasionally there may be other cases where it is necessary.

There is nothing very special about total colectomy to which reference has not already been made. I believe that in future surgeons will prob-

ably attempt to preserve the ileocæcal valve when it is not involved in the disease.

The question as to whether the great omentum should be preserved or removed in total colectomy is of some interest. Personally, I have always removed it with the colon. The fact that my cases of colectomy have so far been free from subsequent adhesions may possibly be due to this removal. Certainly, I have seen no bad results, and some of my cases are alive and well as much as eighteen years after operation.

The operation can be done in either one or two stages. If performed in two stages an ileo-sigmoidostomy is first performed by end-to-side junction, the distal end of the ileum being closed off. At the second stage the colon is completely removed, starting at the cæcal angle, and finally divided just above the previous anastomosis. If the operation is performed in one stage, a procedure which I have generally adopted, the removal of the colon should be performed first, and the anastomosis done last, as this saves time and reduces the risk of sepsis. The ileum should first be divided about 6 inches from the cæcum and the ends closed. The colon should then be freed, starting from the cæcum. The operation takes some time to do, as a very large number of vessels have to be ligatured. It greatly facilitates matters if there is a small sterilized electric lamp available which can be placed in the abdomen and behind the mesocolon, so as to show up the vessels. The splenic angle may cause some little difficulty and complete relaxation of the abdominal musculature is essential and best secured by high spinal anæsthesia with percain. A transverse abdominal incision at the umbilical level greatly facilitates the operation. The anastomosis should be carefully wrapped in fat, and a rubber tube passed from the anus to well above the junction. The abdomen should be well strapped after the operation to make up for the mass of material which has been removed.

Results of Colectomy for Cancer of the Colon. Out of a total of 144 cases of cancer of the colon in my case books there were

The percentage of cures on a five years' basis is 50 per cent., or, deducting the untraced and died of other causes, 54 per cent.

Grey Turner in 1929 reported the after-histories of 115 patients treated by colectomy, with either immediate union or by Paul's method. Of these patients, thirty-two were alive five years after operation, and forty-four had recurrence less than five years after operation.

Paul collected 571 cases in 1933:

9·5 per cent. were treated by exploratory laparotomy only.
22·2 per cent. were treated by colostomy.
16·8 per cent. were treated by lateral anastomosis.
51·5 per cent. were treated by resection.

The mortality in those cases treated by resection and end-to-end anastomosis was 30 per cent.; 75 per cent. of patients were alive two years later, and 30 per cent. ten years later of those who survived operation.

Summary.—1. In cases where acute obstruction is present at the time of operation, a temporary artificial anus or cæcostomy should always be made, and excision of the growth postponed till a later time; or the growth should be excised and the ends of the bowel brought out.

2. Unless the bowel above the growth can be properly emptied before operation, an artificial anus or cæcostomy by the method described (p. 552) should be established before proceeding to excise the growth; or Paul's operation should be done.

3. In excising the growth, the bowel should always be resected, and *at least* an inch of normal bowel removed on each side of the growth.

4. Whenever possible the lymphatic area should be cleared with the growth; but inability to do this is not necessarily a bar to successful removal.

5. The presence of enlarged glands, or adhesions to other structures, should not necessarily be taken as contra-indicating resection, providing removal is possible.

Palliative Operations.—Even when the growth cannot be removed, much may be done by the performance of a suitable operation to render the patient more comfortable and prolong his life. The operations that may be performed for this purpose are:

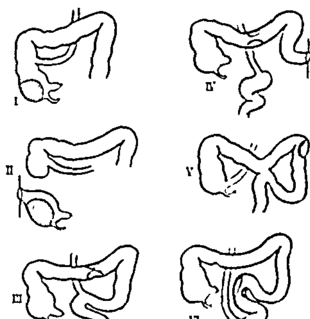
1. Short-circuiting the growth.
2. Making an artificial anus above the growth.

Short-circuiting the growth is undoubtedly the best method when it is found that excision is impossible. It does away with the danger of obstruction, and does not leave the patient with the discomforts of a colostomy.

If the growth is in the cæcum, the ileum should be divided, the cæcal end closed, and the proximal end implanted into the ascending or trans-

verse colon. This gives a better result, and is just as easily performed as lateral anastomosis in this situation. Ileo-colostomy by lateral implantation seems to be the best operation for growths in the right half of the colon, and in the transverse colon.

When the growth is in the left side of the colon, the choice lies between lateral anastomosis between the transverse colon and sigmoid and ileo-sigmoidostomy. In a few cases where the growth is in the centre of the sigmoid loop, lateral anastomosis between the two limbs of the loop will be suitable.



to make a certain diagnosis between these conditions, and in view of this possibility the tumour should either be excised or short-circuited if it can be managed; for if the case is one of these conditions, recovery will very probably follow either of these operations; whereas, if the surgeon closes the abdomen under the impression that he is dealing with a hopeless case of cancer, the patient will almost certainly die.

CHAPTER XXXIV

CLOSURE OF FÆCAL FISTULÆ

A SURGEON may be called upon to close a fæcal fistula which has resulted from disease of the colon from a wound, or, more frequently, which he or some other surgeon has made at some previous time to relieve obstruction or as a preliminary to resection.

Operations for closing fæcal fistulæ are not operations to be lightly undertaken, unless one has had special experience. In unexperienced hands they frequently fail to obtain their object, and are by no means unattended by risk of a fatal issue. One of the chief difficulties is the danger of infection, owing to the presence of exposed mucous membrane at the site of the operation. This can to some extent be got over by disinfecting the exposed mucosa with some suitable antiseptic, or by stitching up the fistula as a preliminary to the operation. The skin, however, in the neighbourhood of these fistulæ is not particularly clean, and wants more than ordinary care to render it aseptic.

Another, and perhaps more serious, difficulty in connection with these fistulæ is that the exact anatomy of the bowel in relation to the abdominal wall cannot from the nature of things be known with any exactitude.

A very common method of attempting to close a fæcal fistula is to dissect the mucous membrane from the skin, and to turn it in by one or more layers of purse-string sutures, subsequently bringing the skin together over the top of it. While this method is occasionally successful, it is quite unsound in practice, and more often than not fails, one of the

to make a certain diagnosis between these conditions, and in view of th possibility the tumour should either be excised or short-circuited if it ca be managed; for if the case is one of these conditions, recovery will ve probably follow either of these operations; whereas, if the surgeon clos the abdomen under the impression that he is dealing with a hopeless ca of cancer, the patient will almost certainly die.

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goes on and our knowledge of the surgery of the large intestine improves it will be less and less resorted to.

We may classify fæcal fistulæ as follows:

1. Temporary colostomies with a spur.
2. Cases where mucous membrane is adherent to the skin. The opening may be quite small, but more frequently is large and accompanied by extensive prolapse of the gut.
3. Cases in which a fibrous track or sinus connects the gut with the skin opening.
4. Cases where the gut opens into an abscess cavity connecting with the surface.

It is obvious that, considering the great variety and complexity of the cases, there can be no one operative technique which is applicable to all, but that frequently some special method will be required to suit the circumstances of the case. Nevertheless, there are certain principles which must always be observed if a good result is to be obtained. Fæcal fistulæ are often complicated by considerable excoriation of the skin around the opening, and in the case of cæcal or small gut fistulæ this is particularly severe. Before any operation is performed the skin must be brought into as good a condition as possible, or there will be little chance of success. For this purpose I administer opium in sufficient doses to cause a considerable degree of constipation and, where possible, the formation of solid stools. After a week or more, if the case is carefully nursed and the skin protected by dressings of lanoline, a very marked improvement will have taken place. Previous to operation the bowel is cleared by enemata and "wash-outs" administered through the fistula, and aperients are not used.

Extra-Peritoneal Methods of closing an Artificial Anus or Fæcal Fistula.— The closure of a colostomy opening will depend very largely upon the manner in which the original operation was performed. When a temporary colostomy opening has been made by the method described on p. 543 with a glass rod or clip, and the bowel has not been completely divided, but only opened on its anterior aspect, it can be quite easily closed without opening the peritoneal cavity. An elliptical incision is made in the skin surrounding the exposed mucous membrane and extended at either end so as to give a free exposure. The skin on both sides is freely separated until the bowel is exposed right down to the aponeurosis. The latter is then separated from the bowel all round, care being taken not to open the peritoneum. With the finger the peritoneum is loosened so that there is plenty of room to push the whole of the protruding bowel under the aponeurosis and muscles. The edges of the mucous membrane of the colon are then trimmed off so as to make a clean edge. The edges are next sewn together with a continuous catgut stitch

the knots being kept on the inside The colon will now be closed, and if the bowel had not been cut across originally, the mesenteric side will be continuous and only the remaining three-quarters of the colon will need to be stitched. A second row of stitches is then inserted to make all secure. The closed colon is now pushed down under the muscles and aponeurosis into the subperitoneal space formed for it, after washing the wound out with antiseptic A small wick drain is inserted. Lastly the wound in the abdominal wall is closed over the colon (see Fig 240). The portion of colon which originally formed the colostomy is thus left in the subperitoneal tissue, and if leakage should occur, it will be externally. This method can also be used when the gut has been completely divided. The ends of the colon are freshened, then anastomosed by suture and lastly buried in the subperitoneal tissue.

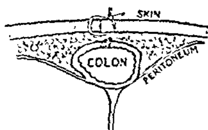


Fig. 240 – Method of closing a Colostomy Opening Extra-Peritoneally

Another plan of closing a colostomy opening without exposing the peritoneal cavity is that used after colostomy by Paul's method, where an enterotome is used (see p 568).

Intra-Peritoneal Method of closing Fæcal Fistulæ.—It is obvious that the choice of method of closing a colostomy or fæcal fistula must depend to some extent upon the ability of the operator and his previous experience of intestinal suture, but I feel certain that the best method is to dissect the bowel out of the abdominal wall, so that the involved loop can be drawn out, and then, after cutting away the edges of the opening or, if necessary, resecting the involved portion of colon, to restore the lumen by direct suture. The restored bowel is then replaced in the abdominal cavity and the abdominal wall sewn up.

One of the important points in operating is to open the abdominal cavity to one side of the fistulous opening. The exact method of doing this varies, but the principle is the same—to get into the abdominal cavity, and then, with the parts well exposed, completely to free the gut and fistula in one piece. The involved parts can then be drawn out of the abdomen and the exact anatomical condition ascertained. It is important to open up the abdominal cavity freely and get a good exposure of the parts involved. As much of the involved portion of the bowel is cut away as is considered necessary, so as to leave quite healthy tissues which can be brought together to form the anastomosis or closure. Sometimes this will involve the complete resection of several inches of bowel, but more frequently a large hole will be left in the bowel which only requires

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careful suturing. It is a point of great importance that the blood-supply to that part of the bowel wall which it is proposed to suture should be carefully preserved. I am convinced that most of the failures are due to this important factor having been neglected, and that failures are far more often due to this than to sepsis from the exposed mucous membrane. The bowel should always be so cut that more of the bowel wall is cut away at the free side than at the mesenteric side, even healthy bowel being removed if necessary. The cut edges of the bowel which are going to be joined should form roughly an angle of 45 degrees with the mesenteric border. This makes certain that the stitches joining the ends of the bowel on the mesenteric side do not cut off the blood-supply to the joined edges on the free side (see Fig. 250).

Lastly, the hole in the bowel is sewn up, the edges being brought together with catgut sutures passing through all the coats, and this line

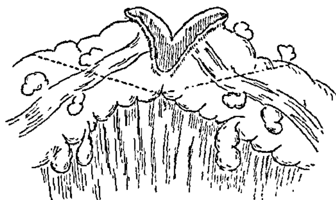


Fig. 250.
Dotted lines show lines of excision.

of suture is reinforced with a second catgut suture through the peritoneal coat only. The abdominal wall is closed, and a small drain, preferably of rubber tissue, is inserted down to the point of closure and brought out between two of the stitches. This drain can be removed in thirty-six hours. It is always advisable to have a drain, as of necessity there must be some infection of the wound by *Bacillus coli*. This infection seldom causes any trouble if a small drain is provided to enable blood effusion to escape, but without such drainage abscess formation is liable to occur. The rubber tissue drain has many advantages over stiff tubes.

As regards after-treatment, my own practice is to insert a rectal tube at the time of operation, and to irrigate very gently with water through this twice daily for the first two or three days. No pressure is used, but the water is allowed to flow in and out again to wash the bowel and keep the tube clear. Liquid petroleum is given daily after the operation, beginning the next day. The object of this is to obtain liquid stools

risk of a ventral hernia, which not infrequently follows extraperitoneal closure.

The most difficult cases to deal with are those in which there is a fibrous *track between the skin and the opening in the bowel. Such cases are* often the result of injury to the pelvic portion of the rectum. It is perfectly useless to attempt to close them by operating upon the skin opening. The only successful method is to open the abdomen well away from the fistula and get at the bowel end of the fistula. This must be cut out and the opening in the bowel closed. The fistula itself can either be cut out or, if extensively involved in adhesions, left to close of itself, which it will soon do if disconnected from the bowel. In *the case of fæcal fistulæ* discharging into an abscess cavity the abscess must be laid open and freely drained, and the fistula operated on later.

Many of these cases of fæcal fistulæ with a fibrous track between the bowel and the skin surface will heal without operation if the patient is kept constipated, so that only solid stools pass the point of leakage, and the fistula itself is left alone; on no account should the fistula be plugged.

Vesico-Colic Fistulæ

The most serious cases are those where a deep abscess in the pelvis has opened into the bladder as well as into the colon, and on to the abdominal wall. Such cases not infrequently result from diverticulitis, *and occasionally from an appendix or other* abscess in the pelvis. Flatus and fæces pass into the bladder and escape per urethra, and urine escapes from the bladder into the colon. There is, of course, a very severe degree of cystitis, and the patient is in a very grave and most miserable condition. Such cases are extremely difficult to deal with, but something has to be done, as the condition is *impossible*.

The first thing is to at once perform a temporary transverse colostomy, so as to prevent fæces from reaching the damaged area. Suprapubic drainage of the bladder is not as a rule necessary, and should be avoided if possible, as it complicates further operation. The bladder after a short time becomes *extraordinarily tolerant of the gross infection. After the* bowel below the colostomy has been thoroughly washed out and the acute symptoms have subsided, the question of operating in order to close the openings will have to be considered, but time should be allowed to see if the sinuses will close of themselves. Unfortunately they seldom do.

The sinuses should be *injected with bismuth and the patient X-rayed* from various angles to try to ascertain as accurately as possible the situations of the various openings before any attempt is made to operate. If there is any acute sepsis the operation must be postponed until this has subsided, and if necessary drainage of the abscess must be established.

Very free exposure *of the pelvis is essential to success, and I have found*

Case.—Mr. T., aged fifty-four, had an acute attack of diverticulitis three years previously, which resulted in a fistula into the bladder and on to the abdominal wall. A colostomy had been performed two years before I saw him, but the fistula into the bladder refused to heal. X rays showed that the pelvic colon communicated with the bladder, and that the abdominal fistula opened into the colon some 3 inches above the vesical fistula. The abdomen was freely opened and the track of the abdominal fistula dissected free down to the colon; the latter was also dissected off the bladder and 6 inches of the colon was removed, together with the fistulous tracks. The ends of the colon were then joined end to end. The opening in the bladder was drained. The wounds all healed well, and he has remained in good health since.

These operations are among the most difficult in surgery, and free exposure and bold resection of all damaged tissue are the chief factors for success.

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